

HYGIENE AND HOME NURSING

LIPPITT



Take pinch of Nutmeg with water,
for Upset Stomach

1 Teaspoonful of Cream of Tartar

1 " Sugar

mix & water. Take, for Bladder
discomfort

HYGIENE AND HOME NURSING

A Practical Text for
Girls and Women

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ILLUSTRATED



WORLD BOOK COMPANY

Yonkers-on-Hudson, New York

WORLD BOOK COMPANY
THE HOUSE OF APPLIED KNOWLEDGE

Established 1905 by Caspar W. Hodgson

YONKERS-ON-HUDSON, NEW YORK

2126 PRAIRIE AVENUE, CHICAGO

Also BOSTON : ATLANTA : DALLAS

SAN FRANCISCO : PORTLAND

12-42

L: HHN-8

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PRINTED IN U.S.A.

PREFACE AND ACKNOWLEDGMENTS

A WOMAN, in the care of her health, has certain special problems. She needs special instruction to help her in meeting them. She has a unique position in the home in that she is responsible for the nutrition of the family and is the nurse when illness comes. She needs special training to fit her for these responsibilities. A woman, to conserve her own and her family's health, needs not only a grounding in general hygiene but also detailed training in certain particular fields of hygiene and in the technique of meeting emergencies and sickness in the home.

This means that to prepare young women for the lives that lie before them, courses in hygiene especially adapted to the needs of girls and instruction in home nursing must be given. It is my hope that solid, informative courses of this kind will soon be much more widely offered, and it is to help in the establishment and giving of such courses that this text has been prepared. From my early years as a daughter in a physician's home and from my life experience in nursing and in hospitals I have become familiar with the health and nursing problems that women most frequently encounter, and I have had the privilege of observing the methods that skilled and scientific physicians advise in meeting these problems. In this text I have tried merely to set forth in a simple manner the information that, from a woman's point of view, seems to be of most practical hygienic worth.

To my sister, Miss Minnie H. Lippitt, I wish to extend my thanks for assistance in the preparation of the manuscript. I gratefully acknowledge also my indebtedness to Dr. William E. Clark, Dr. Louis Green, and Dr. James F. Mitchell, for encouragement and advice; to Miss Bedinger and Mrs. Clark, of the Children's Hospital, Washington, D. C., for X-ray prints; and to Miss Taylor of the same hospital, for her supervision of the photographs of bed making.



Ewing Galloway

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INTRODUCTORY NOTE

As I look back over years of medical practice confined largely to the examination and treatment of patients suffering from nutritional disorders and varying degrees of invalidism, certain facts present themselves in a striking way.

First, the cause of this depleted state of health is almost always the result of lack of knowledge and a consequent failure to conform to nature's laws. Sometimes it would seem as though failure to conform to good mental hygiene, which has brought about a disturbed, anxious, tense mental state, will be the chief factor. At other times it is the failure to conform to good physical hygiene, which would include proper attention to such matters as diet, exercise, and rest. More often a combination of these two factors is operative. The result is a breakdown of the body physiology, and the patient becomes ill. This illness may express itself in terms of nervous disorders, disorders of digestion, or cardio-vascular disturbances. The present Commission on Arthritis looks on this widely prevalent systemic disease as the result largely of a derangement or breakdown of the body physiology.

Secondly, whatever measure of success results from treatment instituted in such cases is due to a scheme that is designed to bring about or restore the disordered physiological processes to normal.

After a preliminary period of rest the patient is entered upon a course of progressive upbuilding, being instructed as to diet, bathing, exercise, rest, and other matters of hygiene. With careful and explicit instruction and with guidance from week to week, especially after a patient gets back to work and has to begin to cope with a more difficult situation, these patients can usually be taught how to live, and in many instances can acquire a state of health beyond what one would have considered possible. Often little or no medicine is required. It is interesting and gratifying to see how the patients

on such a plan, especially when they begin to see how they are succeeding and their health is improving, will coöperate and carry on after they have gone out from under our observation, and will not only reach a normal health level but maintain it.

The results secured in such cases most clearly indicate that great benefit would follow general instruction of our people in the art of living. The laity have shown a tremendous interest in matters of health, and, too, they are remarkably well informed about most medical problems. It is wholesome and encouraging that this should be so, and great good should come of it.

Miss Louisa C. Lippitt, the author of this book, is unusually well qualified to write in regard to matters of hygiene and health. We were associated in the same work for many years and I know she is writing her own first-hand knowledge and experience. Her book will meet a definite need and will be most valuable to those desirous of knowing how best to live and how to keep well.

WILLIAM EARL CLARK

WASHINGTON, D. C.

HYGIENE AND HOME NURSING

CHAPTER ONE

HEALTH GETTING AND HEALTH KEEPING

How often have you heard it said: "I wish the doctors in America were paid as they are in China, to keep their patients well and not to try to cure them after they become sick." It is true that in Europe and America medicines and medical treatments were for centuries given only to cure ailments present, and most of us are yet unwilling to pay for medical advice unless we are already ill. Yet, during recent years physicians have been devoting much time to searching out the causes of disease and to finding how to keep those already in health from becoming ill. These attempts at preventing sickness have been so amazingly successful that where all our modern knowledge is applied we are now able not only to control most communicable diseases but also to prevent many of the chronic diseases of middle and later life. Even the layman now recognizes that in the field of health, prevention is more effective than cure, and to a very marked extent we are using our physicians to keep us well rather than to cure us after we become ill.

A full history of the advances in medicine and surgery that have been made during the last half century is not only most interesting, but is as thrilling as a tale of adventure. Many of those who have investigated the origin and transmission of disease have worked without financial reward, and some have even risked their lives deliberately that others might be saved from illness and death. Among these may be mentioned Dr. James Carroll, who while investigating the transmission of yellow fever in Cuba exposed himself to the bite of a mosquito and thus contracted the disease; Dr. Jesse Lazear, a co-worker of Dr. Carroll, who not only contracted the disease

but died of it; and Dr. Adrian Stokes and Hideyo Noguchi, who later lost their lives in West Africa while investigating this same disease.

The researches of these men and of their associates have removed one of the greatest scourges of the tropics and sub-tropics, and have given to the world a shining example of the value of preventive measures when applied to the problems of health. But this and other work of the same kind has been possible only because of the heroism of those engaged in it. Even when we understand something of the progress that has been made in modern medicine and hygiene, we do not always appreciate the sacrifices through which the advances have been and are being won for us.

Necessity for teaching hygiene to the young. Gradually doctors and others who have interested themselves in the prevention of illness have come to realize that to keep people in health during their more active years and to prevent their becoming invalids in later life, it is necessary to teach right habits of living to the young and to give them a right attitude of mind toward questions of health. The things in life that we have always had, or that come to us easily, we do not value enough, and perhaps it is because nature has been so generous in giving us healthy bodies that we do not realize the possibility of injuring them. A strong, healthy girl frequently receives with impatience a suggestion that she should take care of herself; she feels that nothing can hurt her, and so she recklessly throws away by little foolish acts, sometimes thoughtless, sometimes deliberate, the health which, after it is gone, she realizes was the foundation of everything worth having in life.

One of the trials that older people have to bear is to see girls and boys injuring their health in this way, receiving advice with impatience and continuing to make the same mistakes that their fathers and mothers, perhaps, made in their youth, and for which they are paying now. In my experience I have found it true in most cases, that if a girl is taught something of

her body and the care of it and of the results following its neglect, she will make an effort to live the life that she should, observing the laws of personal hygiene, not spending all her health and strength in her youth, but laying up some of it to use in her future life when the calls upon it may be heavy. Therefore in these chapters the attempt is made not only to teach the right way to live, but to make clear the reasons for so living.

Health needed by the woman of today. A generation or two ago, we are told, a delicate woman was considered quite interesting, and fainting gracefully was an accomplishment to be cultivated. But the woman of today cannot afford to be delicate; there is too much to interest her, and too much that she wants to be able to do and do well. A healthy body, doing its work without effort, is necessary if one is to accomplish and endure, and have strength left for the enjoyment of life and the development of the mind.

Women in quite recent times have entered in a wholesale way into business and industry. They are permanently employed in positions formerly filled by men, and many of them have accomplished a great deal in these positions. You do not want to be behind in the race; and since good health means greater efficiency, you should run no risk of losing

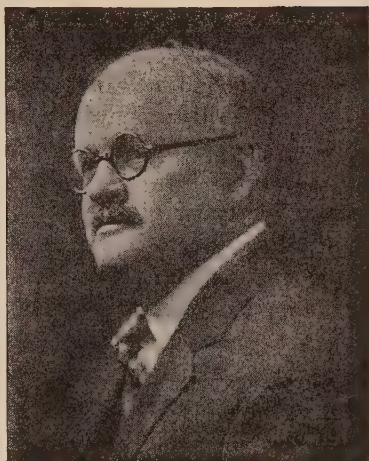


FIG. 1. Dr. William Royal Stokes, one of the noble company who have given their lives for the cause of health. Dr. Stokes was Director of the Bacteriological Laboratory of Baltimore when an epidemic of psittacosis ("parrot fever") broke out in the city. He at once started an investigation of the cause of the disease, contracted it, and died. We should appreciate the bravery and the sacrifice through which the advances in modern medicine and hygiene are being won for us.

your health, nor hesitate at any efforts that will help you to attain health if you do not have it.

Knowledge of health getting and health keeping, though simple in itself, is so often buried in big medical books and obscured by technicalities, that in many cases it is kept from those who need it. It is with the hope of helping to overcome this difficulty by giving to girls and women practical instruction for daily life, in terms clear to everyone, that this book has been written. Its purpose is to explain how a girl may attain health and happiness in the present and lay the foundation for a sane and vigorous old age; to give directions for preventing the spreading of infection from cases of communicable disease; and to furnish instruction in caring for oneself and one's family both under ordinary conditions and in time of accident or sickness in the home.

CHAPTER TWO

BATHING AND CARE OF THE SKIN AND HAIR

CIVILIZATION has been roughly defined as the difference between the washed and the unwashed. Keeping clean is an important matter, and to most persons the daily bath is a pleasure as well as a necessity. Some, however, have neither the time nor the opportunity to bathe daily, so that the ways and means of keeping clean must be, to a certain degree, such as are suited to the individual and his surroundings.

Baths, too, have an important relation to health and for this reason must not be neglected. They may greatly affect the oiliness or dryness of the skin, and through the circulatory system and the heat-regulating mechanism they may have very important effects on the health. The daily bath not only prevents the odor of perspiration, but it may be used to train the skin in the better regulation of the body heat.

The structure of the skin. The skin is composed of two layers: the *epidermis*, or outer layer, and the *dermis*, or "true skin." The epidermis is constantly renewed by growth in its lower part, the surface layer being rubbed off by clothing and in bathing.

The skin contains glands which secrete perspiration, and others which secrete an oily substance that keeps the



FIG. 2. A section of the skin.

skin and hair soft. The latter are called the *sebaceous glands*. The oil from the sebaceous glands becomes mixed with perspiration, dust, and scales from the skin. Unless this material is removed by bathing, it forms a breeding place for germs, which cause blackheads, pimples, and various skin diseases.

The functions of the skin. The skin forms a protective covering for the body ; it helps, through the opening and closing of the blood vessels in it and the secretion of perspiration, to regulate the heat of the body ; it is an organ of touch and for the perception of temperature and pain ; and it eliminates some of the water and a part of the waste products of the body. In addition, the lower layers of the skin help to produce the substances that protect the body from germs, and when sunshine falls on the skin, vitamin D is manufactured in it. The skin is one of the largest organs of the body, and it is much more than a mere covering for the softer inner parts.

Training the skin vessels. The blood vessels in the skin should relax when the body is hot and allow the blood to come to the surface where it will be cooled. They should contract when the body is exposed to the cold and keep the blood in the inner parts so that the heat of the body will not be lost. These vessels are under the control of the autonomic (sympathetic) nervous system, and in some persons they fail to respond to temperature changes as they should.

The usual difficulty is that in persons with sensitive nervous systems there is an over-reaction of the vessels. Cold air on the skin causes the blood to be cut off to such an extent that there is shivering. Feet remain cold in bed because the small arteries do not relax and allow the warm blood to circulate through them. The vessels do not give the proper response to the temperatures to which the body is exposed, and the circulation is in consequence deranged.

By exposure to sudden temperature changes it is usually possible for a healthy person to train the vessels of his skin to respond promptly and to the proper degree to the stimulus of

cold. This training is most easily given through cold baths correctly graduated to the person who is taking them. Most vigorous persons find that a cold bath taken in the morning creates appetite, improves the circulation, arouses the sympathetic nervous system, and is very exhilarating.

The cold bath. A cold tub should be quickly taken — merely a dip ; or the bath may be taken as a shower or sponge. Certain conditions should always be fulfilled : (1) the body should be warm ; (2) the bath should be taken in a warm room ; (3) the bather must be able to react, becoming thoroughly warm after the shock of the cold water. After the bath the skin should be well rubbed with a coarse towel. Sometimes slapping the body all over with the hands helps to warm it.

The best time for the cold bath is immediately after getting out of bed, or after exercise which has quickened the circulation and warmed the body. For many persons the best plan is to warm the body by a hot bath, and to get the stimulation by a cold shower at the end.

The cold bath should not be taken in old age, or, except in very rare cases, in infancy. It should not be taken when one is excessively tired or has not slept well, or when, on account of illness or exposure to cold, the temperature of the body is low, or if the application of cold water is a severe shock and there is extreme shrinking from it. If the bath is followed by a chill, or if, though apparently warming well after taking it, one is fatigued and chilly through the day, the cold bath is not beneficial. Sometimes a cold sponge bath in a warm room, or a cold shower after a hot bath, is an agreeable stimulus to those who cannot react after a cold tub.

The hot bath. To most persons a hot bath, taken at night after a fatiguing day, is refreshing and healthful. It draws the blood away from the muscles to the skin, taking from the muscles the feeling of soreness, and causes a general feeling of relaxation and rest. For exactly the same reasons the bath should not be taken soon after a full meal, as the blood is drawn

away from the digestive organs. At least one hour should elapse between the meal and the bath. With some persons the effect of the hot bath is stimulating rather than soothing, and if taken just before retiring it will keep them awake all night. When this is the case, the hot bath should be taken earlier in the evening. Sometimes a glass of milk or some other light refreshment after the bath will prevent wakefulness; at such times hot milk, hot soup, hot cocoa, or salted hot milk are better than cold food.

A hot bath is frequently good for a cold, but must be taken in the right way if it is to be of use. All preparations for bed should be made before taking the bath,—the bed covers should be turned down, a hot-water bottle or heating pad placed between the sheets, the windows opened, extra covers placed at hand, and everything else prepared. To wander around the room, brushing the hair, looking for a hot-water bag and filling it, and doing other odd jobs, after relaxing in the bath, means that the bath will not only do no good, but probably will make the cold worse.

The tepid bath. When the tepid bath is taken daily, it is not well to stay in the water for more than five minutes. Tepid water does not stimulate the body, and staying in the bath too long will cause a relaxed condition of the muscles and a certain feeling of lassitude.

Sometimes a physician orders a tepid bath to be taken at night, to cause relaxation and counteract the condition of insomnia. In this case one may remain in the water for ten or fifteen minutes. Keeping the water in motion, by letting it run in from the faucet and out at the waste while one is in the tub, is very soothing and conducive to sleep.

Foot baths. Special attention should be paid to the feet, for neglecting them may result in all sorts of pain and trouble. Hot foot baths do much to relieve fatigue. If hot water is not available, and the feet are hot and dusty, they should be sponged off with cold water. If they are swollen and the

muscles are sore and painful, the most efficacious bath is one of alternating hot and cold water. In taking this bath, the feet are dipped, first in cold water, then in hot, changing from one to the other fifteen or twenty times.

There are two ways of taking this type of foot bath. In one method two bowls are used, one filled with hot water, one with cold. The other method is to fill one bowl with hot water and set it in a large bathtub; then, sitting on the edge of the tub, turn on the cold-water faucet and hold the foot first under the running cold water and then in the hot water, changing quickly from one to the other and ending with the cold water.

Cold foot baths and alternating hot and cold baths are beneficial to those who are troubled with cold feet. The changes in temperature of the water help in training the blood vessels to relax when they should.

Care of the complexion. The skin of the face needs special care to keep it in a healthy condition. Being uncovered, it is constantly exposed to the sun, wind, and cold. At night, before one retires, the face must be thoroughly washed to remove the dust and dirt of the day. Bathing first in hot water, then in cold, is refreshing and stimulating to the skin. Blackheads frequently form around the nose if the skin is not kept clear by bathing. After the bath rub the face with a good cold cream, rubbing in small circles and working upward, and removing the surplus cream with a soft towel or cloth.

It is not wise to use creams, soaps, and face lotions which you know of only through unvouched-for advertisements. Choose those made by a good firm with a reputation to sustain. If troubled with acne or pimples, it is best to go to a regular physician who is a skin specialist, and not to a "beauty doctor." Many complexions have been ruined by home treatments and patent medicines.

There are few things more beautiful than a young girl's skin, and cosmetics, no matter how skillfully applied, can never produce the same effect. The care of the complexion must often

begin with attention to the general health, for no part of the body is more directly affected by indigestion, lack of exercise, neglect of bathing, or excessive fatigue than is the skin of the face.

The bowels should be kept regular and the pores of the skin of the whole body kept open by bathing. Water should be drunk freely, and some exercise taken daily in the open air. If sallowness or other defects persist after this, there is probably ill health from some condition that demands medical attention, and the advice of a doctor should be asked.

Cosmetics, soaps, and dyes. Cosmetics, although not always injurious to the skin, do sometimes cause skin eruptions. This is due largely to the fact that they contain chemicals to which many persons are sensitive. Rouges, cold creams, and cleansing creams rarely make trouble, but astringent lotions and creams frequently cause marked irritation, and many creams used for removing freckles contain mercury and are injurious.

Black hair dyes frequently cause a severe irritation of the scalp and adjoining parts of the face and neck, which may last for a long time; but henna rinses affect only certain persons who are especially sensitive to them.

Soaps differ in their effects more than persons usually realize, and a soap that can be used with perfect comfort by one person may not suit the skin of another, but may roughen it or even cause a rash. A greasy skin requires a different soap from that suited to a dry skin; for some soaps (notably carbolic-acid soaps) sometimes cause a condition resembling chapping. Lotions to check perspiration are sometimes irritating to the skin and should be used carefully. Diluting them sometimes prevents the irritating effect.

Care of the hands. The hands should be washed often, especially just before eating. The fingers should not be put into the mouth unless they have just been washed, as they have constantly touched things which may have been touched

and infected by others. Rubbing cold cream into the hands helps to keep them soft and free from cracks. The nails should be scrubbed with a nailbrush, the skin at the bottom of the nail pushed back with the towel at each washing, and the nails themselves kept free from dirt.

If the hands must be put into something that may get under the nails, it is a good plan to scrape the nails first over a damp cake of soap. This will prevent foreign matter from getting under the nails and the soap easily washes out after the work is done.

The nails should be manicured by a good manicurist at least once or twice a month, and cared for carefully between these treatments. The use of the creams and polisher keeps the nails from getting dry and so prevents them from breaking. If the cuticle is dry, a simple toilet lanolin or olive oil rubbed on them at night will improve this condition.

Care of the hair. If the hair is long, it should always be taken down at night. If it is left rolled upon the head, the heating and strain on the roots are likely to cause it to fall out, and sometimes a bald spot may appear at the point where the hair is pinned up. The hair should always be brushed at night. This removes the dust and dirt which has lodged in it during the day. It also stimulates the circulation in the scalp and softens the hair by brushing over it the oil from the sebaceous glands.

If the hair is not brushed daily, it should be washed once or twice a month and even oftener than this in summer. If an abnormal amount of hair falls out, steps should be taken to check the loss. Massage is the best treatment for the scalp, and a little tonic may with benefit be rubbed in once or twice a week. If this does not stop the falling, a series of treatments from a good masseuse will be advisable. Never use a comb or brush which has been used by others; for dandruff, a common germ disease of the scalp, is easily spread by brushes and combs.

The permanent wave, now so common, is as a rule carefully and safely given. Sometimes the hair is not in condition to be treated in this way ; so a careful hairdresser tests a lock of hair first and, if the test is not satisfactory, refuses to give the treatment.

Waving the hair in this manner is apt to make it dry ; so it should be brushed frequently. If the wave has been given correctly, brushing will not take out the curl.

QUESTIONS

1. What two reasons are there for bathing ?
2. Describe the structure of the skin.
3. What are the functions of the skin ?
4. What are the benefits of a cold bath ?
5. Under what conditions should a cold bath be taken, and under what conditions should it not be taken ?
6. Why and when should a hot bath be taken ?
7. Of what benefit are hot foot baths or alternating hot and cold foot baths ? How are the latter taken ?
8. Give some important points in the care of the complexion, the hands, and the hair.

CHAPTER THREE

CARE OF THE MOUTH AND TEETH

THE members of the medical profession and the leading dentists have realized for some time that an unhealthy condition of the mouth and teeth is a cause of both acute and chronic diseases; that when decay reaches the pulp chambers, centers of infection may be established that will remain for years about the roots of the teeth and in the bones of the face; and that these infections may lead to serious diseases of the heart, kidneys, and other organs.

Modern dental hygiene, therefore, has an objective entirely beyond the mere preservation of the teeth. It is one of the major divisions of general hygiene, and may not be neglected by anyone interested in his health.

Importance of preventing tooth troubles. In the oral hygiene movement of recent years, the entire emphasis is placed on preservation of the teeth. While they are yet unimpaired they should be cared for. After decay has set in, the damage can be remedied only in part; and when the germs have made their way into the root canals and the bones of the jaws, they can be eradicated only by the highest dental skill. There is always a possibility, and perhaps even a probability, that teeth which have been filled or crowned after removal of the pulp and treatment of the cavity will still have areas of infected bone about their roots, unless the work has been very skillfully and carefully done.

Early formation of the teeth. The first teeth, and part of the second or permanent teeth, are formed in the jaws before birth, and all the permanent teeth are formed before the end of the third year. If teeth are to be built which will look well and will be hard and last without breaking down, there must be enough of the essential minerals and vitamins in the blood stream during this early tooth-forming period. The belief that



FIG. 3. A radiograph of the jaw of a child, showing the permanent teeth at the roots of the temporary ones. The teeth are formed long before they appear in the mouth, and an adequate diet in the early months and years is necessary to insure that they will be hard and sound.

"good teeth run in families" is well founded, more because good food and hygienic living belong to the family tradition than because of heredity. The content of the food eaten and the care given to the teeth are of much more importance than the type of teeth which may have been inherited. If the right substances are not furnished in the food, the enamel of the teeth

is defective and the body of the tooth has a porous, spongy structure.

As the infant before birth and during the nursing period is dependent upon its mother for nourishment, it is essential that the mother shall eat food containing the necessary vitamins, lime salts, phosphorus, and other minerals and food elements which the infant needs for its growth and development. If the diet of the mother is not what it should be, not only the temporary but also the permanent teeth may be affected. After birth the diet of the infant must supply the right materials for further growth of the teeth and for causing the mineral matter to be retained in them.

Foods essential for tooth formation. Research has shown that dental disorders, not only of infants and growing children, but of adults as well, are due largely to the character of the food taken. At present the substances considered necessary for forming sound, hard teeth and for preserving them are calcium and phosphorus, and the vitamins C and D. These substances must be taken in the food, and foods that supply them

in especial abundance are milk, eggs, fish, whole cereals, fresh fruits, and fresh vegetables. Phosphorus is particularly likely to be lacking in the diet, and foods that are rich in this should always be included in the diet of adults.

Sugar is entirely devoid of minerals and vitamins, and too much sugar eaten during childhood will cause tooth decay. Children need a certain amount of sweets, but if large amounts of sugar are eaten, other foods are not taken and the minerals and vitamins necessary for tooth building and tooth preservation are not supplied.

Sometimes an illness during the time when the permanent teeth are developing will interfere with the perfect formation of the enamel and leave weak places for the development of decay.

The care of the first or temporary teeth. The first of the deciduous, or temporary, teeth usually erupt between the fifth and the ninth month. As soon as they appear, these teeth should be looked after as carefully as the teeth of an adult. The mouth and teeth should be washed twice a day. In doing this, a soft cloth, or better a small brush with soft bristles, may be used. After all the temporary teeth are in place, the child should be taken to a dentist every four months, that the teeth may be watched, cleaned, and filled when necessary.

For several reasons it is very important that the first teeth be preserved. (1) Because the pain associated with decayed, aching teeth causes nervousness and loss of sleep. (2) Because if the teeth are not filled, abscesses in the gums may develop which may materially affect the child's health and may injure the enamel of the second teeth. (3) Because decayed temporary teeth interfere with the proper placing in the jaws of the secondary teeth. As the permanent teeth form and grow in the jaws, the roots of the temporary teeth are absorbed. Where a temporary tooth is dead, the roots are not absorbed and the tooth does not loosen and drop out when it should. Then, unless the tooth is extracted, the permanent tooth that

should displace it will come through either inside or outside of it, thus causing the row of teeth to be irregular.

Teething, or the eruption of the first teeth. The first symptoms of teething are an increased flow of saliva, fretfulness, restlessness, a desire to bite on something hard, a swollen, bulging appearance of the gums, and sometimes (not always) a slight fever and looseness of the bowels. Frequently, however, there is no marked disturbance, and ailments which are often attributed to teething may be due to other causes, such as improper feeding, lack of fresh air or sleep, or infection of some kind. A baby with the above symptoms should be carefully examined to eliminate other causes before it is concluded that its condition is due to erupting teeth.

During the period of teething, the baby should be given an abundance of water to drink and his food must be watched with even more than usual care. An ivory or bone teething ring may be used to help bring the teeth through. The custom of allowing the baby to bite on the fingers of the mother or of anyone else is not a good one, as in this way infection may be carried into the mouth of the baby.

The permanent teeth. At about the sixth year the first permanent molar appears, and then the other permanent teeth gradually take their places until at the age of twelve all but the



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FIG. 4. A drawing showing the effect of the loss of the 6-year molar. The teeth in front of the opening have moved back and the lower jaw is too short.

wisdom teeth have erupted. If the teeth do not appear at the usual time, it is well to consult a physician, as there may be some food deficiency which is interfering with their proper development. The wisdom teeth may come as early as at the age of sixteen, or they may not appear until toward middle life. Some persons never get them.

The six-year molars are the guides by which the other permanent teeth are brought into their places, and therefore it is especially important that they should be preserved. One reason for giving the temporary or baby molars special care is that if they are lost, the six-year molars are likely to crowd forward and not leave room for the other permanent teeth that come into the mouth in front of them. As a consequence, some of these will come through in front of or behind the dental arch, and the line of teeth will be irregular.

These irregularities should be prevented by preserving the temporary teeth from decay, but if the permanent teeth appear in an irregular line, they should be straightened early, even at an age as early as eight and a half to ten years. It is, however, much better to take care of the temporary teeth so that the permanent teeth will grow out in their right positions and not have to be straightened later.

Other causes of malocclusion. Other common causes of malocclusion (improper fitting together of the teeth) besides the loss of the first teeth are thumb or finger sucking; mouth breathing from enlarged tonsils and adenoids; and lack of use caused by too soft food. Loss of some of the earlier-appearing permanent teeth is also a common reason for teeth coming in out of place. As we have seen, it is very important to preserve the six-year molars and the other permanent teeth that appear early.

Decay at the time of eruption. The second teeth frequently show defective enamel at the time of their eruption, and in consequence decay quickly sets in. This is particularly true of the six-year molars, which often have defective enamel and pits in their surface that hold food. Children's teeth should therefore have a thorough examination at least every four months, and all necessary fillings should be put in at the first appearance of decay. If this were done more universally, it would preserve a large per cent of the teeth that are now lost.

Brushing the teeth. The teeth should be cleaned at least twice daily, oftener when possible, and after each meal they



FIG. 5. Toothbrushes of different sizes and shapes. By using more than one brush the surfaces of all the teeth can be more thoroughly cleaned.

should be rinsed with tepid water or salt and water to remove all particles of food which may have lodged between them. It is well to brush the teeth and rinse the mouth with tepid salt water in the morning before breakfast. The gums should be brushed as well as the teeth, for they need a certain amount of friction to keep them healthy. A brush with medium stiff bristles is best, and if decay is to be prevented all the surfaces of the teeth must be reached.

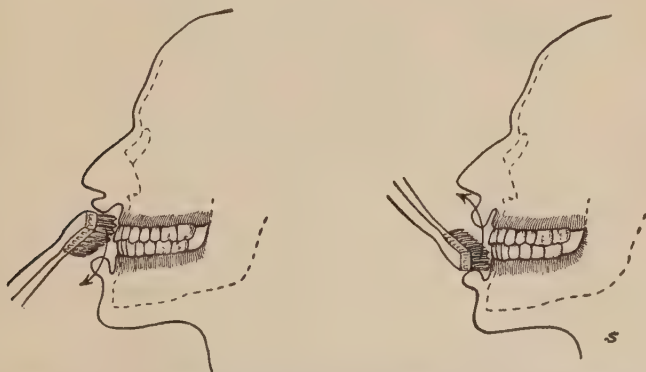
The brush and its care. Most of the brushes used for cleaning the teeth are too large, making it difficult to cleanse properly the back teeth, where the space is narrow between the jaws and the cheeks. An adult should use a brush almost as small as the brush which is usually sold for a child, and anyone who has once become accustomed to a brush of that size and has experienced the feeling of cleanness that the mouth has after its use, will never again be satisfied to use a larger one. There is a small brush with a slender curved handle and a tuft of bristles only as big as the end of the finger, which is made for use in cleaning the inside of the teeth and around the wisdom teeth and molars. This brush is very satisfactory, and with it and a larger brush one may clean all the surfaces of the teeth most thoroughly.

It is best to have two sets of brushes, one for the morning and one for the evening. This allows the bristles to dry thoroughly and restores their efficiency. The brush should be thoroughly washed out after use — if possible, rinsed under a forcible stream — to cleanse it from all powder, paste, or particles of

food which may remain in it. Hang the brush up away from dust and other brushes.

Correct method of using the brush. In cleaning the teeth, place the brush upon the gum and then, with the upper and lower teeth held slightly apart, bring the brush with a rotary motion down to the end of the teeth. Clean first the upper teeth and then the lower, each set separately. The brush should never be brought from the upper teeth down over the lower or from the lower up over the upper, as by this method particles of food are forced under the edges of the gum. The rotary movement causes the hairs of the brush to penetrate between the teeth and thoroughly cleans in between them. The inside of the teeth is cleaned with the small brush, turning it with the same rotary movement. Brush the masticating surfaces of the teeth with an in-and-out, side-to-side movement. This cleans the pits and grooves.

Tooth pastes and powders. Mouth washes, powders, and pastes are of little good as disinfectants, but they help to clean the teeth and mouth and leave a pleasant taste. No gritty powders should be used, as they may injure the enamel and make the teeth more liable to decay.



FIGS. 6-7. In brushing the teeth the movement of the brush should be away from and not toward the gums.

Use of toothpicks and silk. Floss silk may be used between the teeth to remove particles of food which have been pushed



FIGS. 8-9. Correct positions of the brush in cleaning the inside of the front teeth.

between the teeth too forcibly to be removed by rinsing, but silk should not be used if the teeth are very close together. When it is impossible to get the silk between the teeth without using force, it is difficult to keep it from striking and lacerating the gums and thus leaving them in a condition in which they may become infected. A toothpick is not advisable, as it frequently lacerates the gums; but if its use is unavoidable, care should be taken not to injure the gums. If there are spaces between the teeth into which particles of food are forced and where they are retained, the condition should, if possible, be remedied by the dentist.

Preventing the formation of cavities in the teeth. The most common disease of the teeth is dental decay. This starts, not from within the tooth but from without, and is caused by bacteria growing in the material that adheres to the teeth. The parts of the teeth most likely to decay are the places that are somewhat protected from friction and where food is left to ferment and form an acid which destroys the enamel, or hard

outer coating of the tooth. These points are: (1) between the teeth, (2) in the rough surfaces of the molars, and (3) along the edges of the gums.

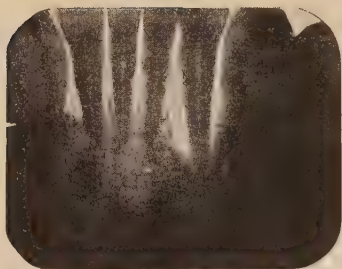
After the enamel of the tooth is once broken, it is an easy matter for the bacteria to penetrate into the softer part of the tooth and continue the process of decay. Anything which injures the hard surface of the tooth will enable the germs to enter. Keeping the mouth absolutely clean by frequent brushing and rinsing helps greatly in preventing decay.

In addition to this care, a dentist should be visited four times a year and any material that adheres to the teeth along the margin of the gums should be removed. For some persons this is very necessary. In spite of careful brushing, tartar forms in some mouths.

A diet lacking the proper minerals and vitamins will not only cause defective teeth to be formed, but will cause hard teeth, even after they are formed and in place, to lose their mineral matter and become soft. A person who is troubled with dental decay should change his diet, making sure that he changes to one that is complete.

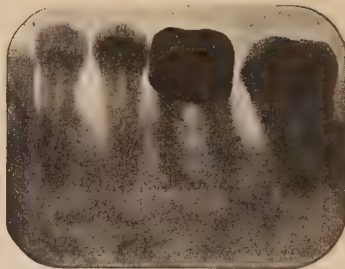
Care of the teeth during sickness. Especial care should be given the mouth during a long illness, particularly when there has been an excessive amount of fever. Not only should the mouth be thoroughly washed out by the nurse, but the teeth should be cleaned. If the patient is very weak, the nurse should clean them with a cotton or gauze swab. This may be wrapped over an orange stick or a small sponge holder so that the inside and distant parts of the teeth can be reached; or a very small toothbrush can, with a little care, be used.

Pyorrhea. Pyorrhea, or "Riggs' disease," as it is often called, is a disease of the membrane covering the roots of the teeth, the gums, and the bony sockets. The disease, according to several authorities, is caused by an infection of the soft tissue. This may have followed a slight injury to the gum, or it may have resulted from a loss of resistance on the part of the



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FIG. 10. Radiograph of four lower anterior teeth, showing bone destruction around the roots due to pyorrhea. The light areas about the roots of the teeth are the infected parts.



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FIG. 11. Radiograph showing two pyorrhea pockets about the teeth. The first molar, which has a gold crown, is apparently alive and healthy. The two large light areas are the infected parts.

gum through lack of use or some systemic condition. The loss of one or more teeth, which interferes with the normal function of the remaining teeth, is a predisposing cause. The presence of the germs is of course a necessary factor, for the disease cannot develop without them. Injuries to the gums may be caused by the improper use of toothpicks, by improperly fitted bridges and crowns, by overhanging fillings, by food which has been forced between the teeth, by injuries caused by careless use of dental instruments, rubber dam, or clamps.

Dr. Riggs's theory was that the disease is caused by the accumulation of tartar about the teeth, which, extending down under the margin of the gum, starts an inflammation in the gum which causes it to shrink, and as the tartar extends farther and farther down on the tooth it gradually forces the gum out of place. In some cases pus is found about the roots of a tooth; but sometimes, without the appearance of pus, the tissue around the root is destroyed and the tooth loosened until it drops out.

Symptoms of the disease. The first symptom recognized is an inflammation. A red, spongy appearance of the gums is noted, especially between the teeth. The gums bleed easily under pressure. In its early stages the disease is not easily

recognized. Its presence then can be determined only by a thorough examination given by a good dentist.

Treatment. Upon the first appearance of the symptoms, the mouth should be put under the care of a competent dentist. Excessive stress on any individual teeth should be noted and the stress equally distributed. All tartar should be removed and the teeth thoroughly cleaned and polished. All cavities should be filled, faulty fillings removed, septic teeth which cannot be sterilized should be removed, and the mouth and teeth put into the best condition possible. At least four times a year the teeth should be inspected and all necessary work done. When the treatment of pyorrhea has been properly conducted, and prophylactic treatments are given at frequent intervals, the recurrence of the disease is rare, in case the home care of the teeth is faithfully adhered to.

As the toothbrush coming in contact with ulcers or infected teeth can retain the infective material, a brush should be frequently sterilized during and after treatment for any mouth infection.

Results of pyorrhea. Until recently the local effect of pyorrhea upon the mouth was the only one considered, but now the possibility of the injurious effects of this disease upon the whole system is thoroughly recognized by the medical profession.

Pus, septic discharges, toxins, and sometimes the germs themselves are carried all through the body by the blood stream. It is believed that these toxins and germs may cause such conditions as appendicitis, nephritis (inflammation of the kidneys), rheumatic fever, inflammation of the intestine, arthritis deformans, hardening of the arteries, anemia, tonsillitis, gastric and intestinal ulcers, carbuncles, abscesses in glands and other tissues, nervousness and mental disorders, and certain types of heart disease. Because of the possibility of the development of some of the diseases listed above, one can see the absolute necessity of giving proper care to the mouth both in the daily cleansing of the teeth and in frequent visits to the

dentist, and should realize how foolish it is to allow the teeth to become decayed and infected because of the annoyance or possible pain which one may suffer while undergoing a treatment by the dentist.

Alveolar abscess. Another disease which is a cause of infection throughout the body is abscesses at the roots of the teeth. A dental abscess (gumboil) usually follows the death of the pulp, the germs working up from the dead tissue into the bones of the jaw. Abscesses may be acute, when there is excessive pain and inflammation, or they may be chronic and caused by bacteria of a low form of virulence, with little inflammation and no pain. Sometimes a chronic infection follows an acute attack and spreads in the bones of the jaws and face, injuring the tissue and poisoning the whole system, while there are absolutely no symptoms in the tooth itself to give warning of the mischief that is being done. Abscesses of this character can be detected only by the use of the X-ray and are found only when some condition of the body arises which starts a search for the source of infection.

It is most important that any cavities that form in the teeth be filled while they are yet small ; for after the pulp dies it requires very skillful dental work to save the tooth and at the same time make sure that a center of infection at the root of the tooth and in the bones of the jaw that will be most dangerous to the general health is not being established. It is because of this fact that prevention has come to occupy so prominent a place in the hygiene of the mouth and teeth.

Vincent's infection. During the war a disease called "trench mouth" became prevalent among the soldiers. It was communicated from one to another because of camp conditions and necessarily poor hygiene. This disease, a membranous gingivitis (infection of the edge of the gum), is known to dentists and physicians as *Vincent's infection*.

Vincent's infection may be acute, subacute, or chronic ; and it may be recurrent — that is, returning after an intermission

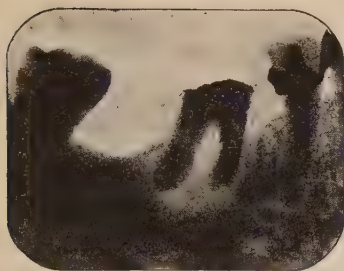
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FIG. 12. Radiograph of aching molar. The light area around the roots of the tooth in the center of the cut is due to bone destruction and the presence of pus. At the right is shown a tooth with a well-made porcelain crown, but the root canal has not been perfectly filled.

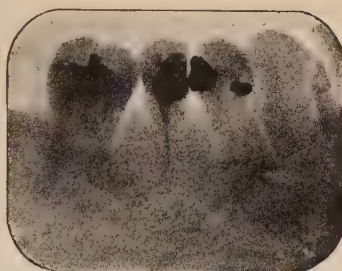
*Walter E. Fancher, D. D. S.*

FIG. 13. The patient experienced no pain from any of the teeth, but the radiograph shows that the root canal of the second tooth from the left is only partially filled and the light area at the root indicates infection and the destruction of bone.

when it is apparently cured. It is most common in persons between the ages of sixteen and twenty-five, although the very young and the very old may have it. It is communicable, but is most likely to develop in the poorly-cared-for mouths of those suffering from malnutrition, and it is sometimes a complication of infectious diseases. It may be contracted from food or from contact with contaminated dishes or drinking cups or in kissing. Not infrequently the germs of Vincent's infection are found in healthy mouths.

The most severe conditions appear under flaps of tissue, in deep pockets of the gums, or around impacted teeth. The acute symptoms may appear after a tooth has been extracted, and the onset may be sudden. The characteristic symptoms are ulcers covered by whitish gray membrane, which when wiped off leaves a highly inflamed, often bleeding, surface. The lymphatic glands are swollen, there is fever (100° to 102° Fahrenheit), loss of appetite, and general feeling of depression. In chronic cases the ulcers contain pus and there is a disagreeable odor from the mouth.

Treatment should be given by a dentist and given fre-

quently. Sodium perborate kills the germs, and a saturated solution of this or even a thick paste of the perborate made up in water is used on the gums. After the inflammation has subsided, the teeth should be put in perfect condition, bridges should be examined, and the mouth X-rayed for infected roots of teeth or imperfect fillings.

Persons who are susceptible to Vincent's infection, or have recurrent attacks, should, as a preventive, use one of the dentifrices having a soap base. To prevent reinfection of the gums, anyone with the infection should, after using his toothbrush, cleanse it with soap and water, dip it in sodium perborate solution, dry it, and keep it in the sunlight.

Vincent's angina, an inflammation of the throat, is frequently confused with trench mouth, or Vincent's infection. It is, however, a different disease.

QUESTIONS

1. When are the first teeth formed?
2. When are the second teeth formed?
3. Mention reasons why good teeth run in families.
4. What chemicals and vitamins are essential in the formation and development of teeth?
5. What care should be given the first teeth?
6. How does neglect of the first teeth affect the second teeth?
7. What are the symptoms of teething?
8. When do the permanent teeth appear?
9. Why is the six-year molar of such importance?
10. Give common causes of malocclusion.
11. Describe in detail the daily care of the mouth.
12. What causes cavities in the teeth, and where are cavities most likely to form?
13. Describe pyorrhea and tell of its general effects upon the health.
14. Why is it that physicians request X-rays of the teeth, particularly when there are dead teeth in the mouth?
15. What is the disease known as "trench mouth," and how should it be treated?

CHAPTER FOUR

EARS, THROAT, AND NOSE

THE ears, throat, and nose are so closely related anatomically that a disease affecting one of these organs is likely to affect them all. It is not safe, therefore, to overlook any diseased condition of these organs under the impression that its effect will be limited to the part in which it first appears; if a head cold is neglected, the infection may very readily spread to the ears or bronchial tubes.

Moreover, the various parts of the body are far more closely related than is generally supposed, and local disease quite frequently reacts upon the whole system and lowers the general vitality. For this reason the general effects of diseases affecting the ears, nose, and throat should be especially watched.

Anatomy of the ear. The ear is not only one of the most important organs in the whole body, but one of the most delicate, and it needs much more careful attention than it usually receives. It is divided into three parts, the *outer*, the *middle*, and the *inner ear*.

The outer ear is composed of the *auricle*, or what we commonly call the ear, and a tube or canal leading into the middle ear. At the inner end of this tube and separating the outer and middle ear is the *tympanic membrane* or "drumhead." The auricle is of a shape suited to catch the waves of sound and convey them into the tube. In the walls of the tube or canal of the external ear are glands which secrete wax, which protects the canal from the entrance of insects. Normally the wax is secreted only in sufficient quantity to do its work, and any over-production is due to inflammation. Digging into the ear with hairpins or pins will cause an abnormal secretion of wax. One of the common causes of deafness is an over-accumulation of wax in the canals and on the tympanic membranes, interfering with the progress of the waves of sound.

The middle ear is a small, drum-shaped cavity in the temporal bone, called the *tympanum*. It is filled with air and

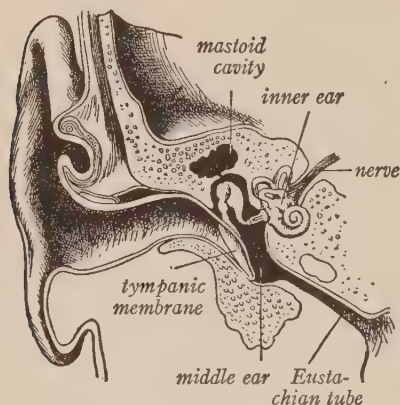


FIG. 14. Diagram of the ear.

through the *Eustachian tube* connects directly with the throat. The connection with the throat is cut off by a small fold of membrane which covers the end of the tube like a little lid, and closes it except during the act of swallowing.

The tympanum also connects with a number of small cavities or sinuses in the temporal bone. The largest of these cavities is the *mastoid sinus*, which

is in the bony prominence behind the ear.

Within the tympanum are three little bones, the *malleus* (hammer), the *incus* (anvil), and the *stapes* (stirrup), thus named because of their shapes. They form a chain across the tympanum, connecting the tympanic membrane with the inner ear.

The inner ear, like the middle ear, is hollowed out in the temporal bone. It consists of three main parts, the *vestibule*, the *cochlea*, and the *semicircular canals*. The inner ear is very complex, and its three parts taken together make up the *bony labyrinth*. This is filled with liquid in which, like a detached lining, lies a *membranous labyrinth* similar in form to the bony labyrinth.

The *auditory nerve* which connects the ear with the brain terminates in this membranous labyrinth. The branch which passes from the cochlea to the brain carries the impulses which give the sensation of sound. When a wave of sound reaches the external ear, it passes through the outer canal, strikes

against the tympanic membrane, and causes the bones of the middle ear to vibrate. These bones are so connected with the inner ear that their vibration sets the fluid in it in motion, and when the waves in this fluid strike against the endings of the auditory nerve, the impulses are conveyed to the brain.

Causes of deafness. Deafness may be due to several causes :

(1) *Accumulation of wax in the outer ear.* When this accumulates in too great amounts, it should be removed by washing out the ear. When hardened wax has accumulated in the ear, it may be necessary to have a physician remove it.

(2) *Injury to the drumhead.* This is often the result of the air being suddenly forced against it by a violent blow, of perforation by the point of a hairpin or other sharp instrument, or of an accumulation of pus in the middle ear.

(3) *Infections of the ear.* Earache, running ears, abscesses in the ears, and practically all other troubles with the middle and inner ears are due to infections with germs. Very frequently in young children the germs of colds find their way up the Eustachian tube and attack the middle ear as well as the mucous membrane of the nose and throat.

In scarlet fever the ears are frequently attacked, and infections and abscesses in the ears often follow cases of influenza. Persons with infected tonsils and adenoid growths are especially likely to suffer from ear troubles, the germs working up the Eustachian tubes from the infected centers in the throat. Violent blowing of the nose or improper use of the nasal douche may force germs from the mouth and throat into the Eustachian tube and start inflammation there. Unless this inflammation is treated and cured, the walls of the tube become swollen and thickened and the air supply to the middle ear is lessened or even cut off. Sometimes in an infected ear the chain of bones is broken down or the joints between the little bones become stiff. This prevents the transmission of the waves of sound and causes deafness.

Treatment of deafness. Many cases of deafness can be cured if taken in time. Specialists are often unable to cure some particular case because they were not consulted until too late to make the cure possible. The first symptom of deafness should be the signal for a thorough examination by a specialist. If the treatment is begun upon the first evidence of inflammation in the ear, a quick cure may be possible. If there is any trouble in the nose or throat, these parts should be treated. It is usually impossible to treat infections of the middle ear successfully with the tonsils or adenoid growths serving as breeding places for germs at the mouths of the Eustachian tubes.

A common mistake in the treatment of ear trouble is that of discontinuing treatment before a complete cure is made. If the inflammation has continued for months, or if the walls of the tubes have become at all thickened, it is out of the question to effect a cure in a short time.

Earache. Earache should never be neglected. Owing to the openings between the middle ear and the sinuses in the bone about it, an abscess in the ear may spread until the bone itself is affected. Pus must find an outlet. When contained in a bony substance it is not only extremely painful, but, unless an outlet is provided, it will penetrate into the tissue or through the membrane. Thus an abscess in the ear spreading into the mastoid cavity causes mastoiditis, and unless relieved by operation, may penetrate into the brain and cause an abscess in the brain which eventually may be fatal. Nothing will check the spread of infection in the ear so effectively as an opening in the tympanic membrane through which the pus may escape. The small, clean-cut incision made by a surgeon will close, and does not injure the membrane as it will be injured if the pus is allowed to force its own way through. If there is earache, no time should be lost in consulting a specialist.

Temporary relief of pain in the ear. One must be very careful in inserting anything into the ear, for digging into the ear canal not only increases the accumulation of wax, but may

cause a condition of inflammation in the ear or even perforate the drumhead. For the relief of pain, hot cloths or a hot-water bag may be applied externally; but hot oils or medicines should never be dropped into the ear, nor should poultices be applied, nor the ear syringed out, except by the order of a physician.

The throat. It is not necessary in a small book like this to enter into a full description of the anatomy of the throat, but it is important to call attention to the fact that any disease of the throat must inevitably affect the system very directly. One of the commonest diseases of the throat is adenoid growths and an infected condition of the tonsils. The healthy state of the throat is of the greatest importance to every individual, and has much to do with the health and development of children.

Adenoids and infected tonsils. The tonsils are two bodies of soft tissues, one on either side of the throat. High in the back of the throat behind the openings from the nose lies a third, small tonsil.

When this third tonsil becomes enlarged, it is called an *adenoid* or an *adenoid growth*. During childhood, tonsils are always somewhat enlarged, but unless they become diseased they gradually become smaller, until, in adult life, they can hardly be seen at all.

Because of their position in the throat and because of their spongy nature and the fact that they have crypts and

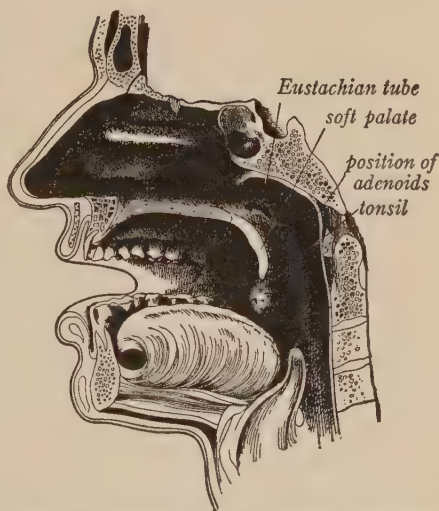


FIG. 15. The nasal passages, mouth, and throat.

openings leading down into them, the tonsils often become infected with germs. They then serve as breeding centers for pus-forming bacteria; and in the diseased



FIG. 16. An adenoid growth in the throat seen from the front. (After Wingrave.)

tissues of infected tonsils diphtheria germs, tuberculosis germs, and perhaps the germs of other diseases, like influenza, colds, and pneumonia, find a fertile soil for growth. It is believed, also, that germs and toxins from the tonsils are carried through the whole body and cause such diseases as hardening of the arteries, rheumatism, and other chronic ailments. In many cases of chronic infection of the tonsils there is no pain at all, and the trouble cannot be detected by casual examination.

Effects of adenoids and enlarged tonsils.

A child having enlarged tonsils and adenoid growths has difficulty in breathing through the nose, and sleeps with the mouth open. The nose, having been evolved for breathing purposes, warms the air as it enters, and the sticky mucous membrane with which the nasal passages are lined catches the dust and thus purifies the air. When cold air is breathed in through the mouth, it is taken directly into the throat and passes unwarmed even into the trachea and bronchial tubes, and the impurities it contains have no chance of being sifted out, but are drawn into the air passages and lungs.

A child with adenoid growths does not develop as it should. As a rule such children are pale and nervous, do not sleep well, have little appetite and poor digestion, contract diseases readily, and are more or less retarded both in mental and physical development. Frequent colds and abscesses in the ear, even deafness, may result.

Operations on the tonsils and adenoids. If the tonsils are diseased or adenoid growths are present, they should be removed. Only a skilled surgeon, of course, should perform this

operation, as it is a delicate one and the organs lie close to important blood vessels. The operation is frequently performed on an adult under a local anæsthetic, but a child should be given a general one. After removal of the adenoids and tonsils, the improvement is usually marked. Backward children often become mentally alert and their physical development improves, until in a year or two they are hardly recognizable.

Anyone who has seen a case of diseased tonsils and adenoids before and after the operation for removal would never hesitate about deciding to have this operation performed upon a child. The increased appetite, added weight, and change in mental and physical development are unmistakable. It may be hard for the parent to consent to the operation, but the longer a diseased tonsil is left in the throat, the weaker the body becomes and the greater is the danger from the operation; also the improvement after the operation has been performed is far slower.

Many cases have come under my notice in which the result of an operation on a child affected the parents in a very interesting manner. In one family, in which the father insisted that he did not believe in operations in any circumstances, the tonsils of one child became so diseased that the physician in charge refused to take the responsibility for the patient's life without an operation, and the father was obliged to consent. The improvement in the child, both physical and mental, was so extraordinary that the father has not only had his second child operated upon, but frequently advises other parents to take their children for

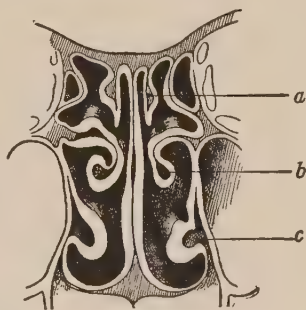


FIG. 17. A cross-section of the nasal chambers, showing the turbinated bones (*a*, *b*, and *c*) over which the air passes. The thin dark line in the center is the septum, which separates the two sides of the nose. The mucous membrane is shown in white.

examination, and even blames them for hesitating in case the operation is advised. One boy whom I knew was so thin, at the

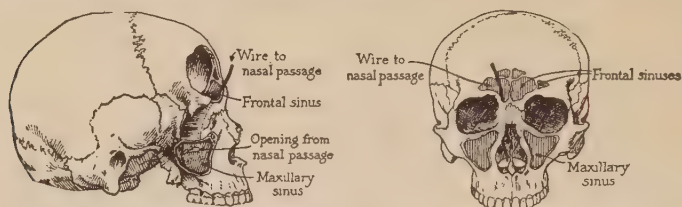


FIG. 18. The skull, showing the location of the frontal and maxillary sinuses.

age of four or five years, that he was a pathetic sight. He had never had an appetite, and had to be coaxed and persuaded to eat at all. A year after the removal of his tonsils his mother was heard to say that she almost wished that part of them could be put back because it was so difficult to get enough for him to eat. Now, after four or five years, he is a fine, well-grown, sturdy boy, very much alive mentally and physically.

The immediate bad effects of such an operation last only a short while. The child may improve little for two or three months, or even longer, but at the end of that time the gain will be definite and one will never be sorry that the operation was performed. For two or three days after the operation the patient should be kept in bed, and should not be left alone for fear of hemorrhage. This rarely occurs, but is a possibility. If it does occur a physician should be summoned, the child should be kept absolutely quiet, and ice compresses should be applied on the outside of the throat.

For a few hours after the operation there may be vomiting of mucus and blood. This blood is not an indication of hemorrhage, but is the blood which has been swallowed during the operation.

The child should not become over-fatigued, or be exposed to sudden chill, and he should be kept on liquid diet for two or three days. Ice cream is permitted by most surgeons soon

after the operation. It is nourishing and cooling to the inflamed throat, and is frequently a great help in keeping a child contented during the discomfort of the first two or three days.

Anatomy of the nose. The nostrils open back into the nasal chamber. This chamber is divided by a thin vertical partition of bone called the *septum*. Projecting out from the walls of the two compartments are other thin bones of irregular shape which are called the *turbinated bones*. When air is drawn into the nose, it passes over the turbinated bones and is thus warmed and cleansed of its dust.

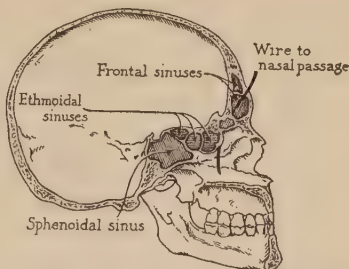


FIG. 19. Section through skull, showing location of ethmoidal and sphenoidal sinuses.

In the bones of the face are cavities called *sinuses*, which connect by small openings with the two chambers of the nose. In the forehead are the *frontal sinuses*; in the cheek bones, the *maxillary sinuses*; and above and to the back of the nasal chambers are the *ethmoidal* and *sphenoidal sinuses*. These sinuses are air chambers and are lined with mucous membrane of the same nature as that found in the mouth, nose, and throat.

Abnormal growths in the nose. The nose may become stopped up and breathing be interfered with by the growth of parts of the mucous membrane into what are called *polyps*. In a certain diseased condition of the nose the turbinated bones become thickened and partly close the opening of the nostrils. Or the septum may become bent and bowed out to one side so that it partially or almost entirely blocks one side of the nose. These conditions will cause mouth breathing as surely as will adenoid growths, and they should be corrected by operation, to prevent the evil consequences of mouth breathing and to promote the general health.

Early treatment of nose and throat infections advisable.

Diseased conditions of the nose and throat may lead to a bronchitic condition or to infection of the sinus cavities. Such infections should be given immediate attention, for they often become chronic and constitute a serious menace to health. In many cases only a protracted building up of the patient's strength and immunity will overcome the infection (page 193).

Nose and throat infections are likely to be followed also by infections of the middle ear. Most cases of deafness are due to this cause, and the most effective method of preventing deafness is to give attention to the nose and throat conditions that cause it. If this is not done, even though the ear infection in time disappears, the hearing is likely to be permanently impaired. Fortunately, devices for aiding the hearing that are not burdensome to wear and are in many cases effective are now available.

QUESTIONS

1. Describe the ear.
2. Give three causes of deafness.
3. Why is it that, while in so many cases deafness is preventable, so many persons become deaf?
4. Of what is earache a symptom, and why should it be relieved promptly?
5. What foreign matter is it permissible to insert into the ear without the doctor's orders?
6. What simple remedies can be used for the relief of earache?
7. Describe the tonsils.
8. What are adenoids?
9. Give some of the effects of adenoid growth and of chronically infected tonsils upon the system.
10. What should be done in cases of adenoids and infected tonsils?
11. What and where are the sinuses?
12. How do they become infected?
13. How do the ears become infected during a cold or other diseased conditions of the nose and throat?

CHAPTER FIVE

THE EYES

THE eye is one of the most delicate and easily abused organs of the body, and undoubtedly the most carelessly used of all. Its formation is exquisite, its muscular arrangement wonderful, and its nervous mechanism complicated and curious in the extreme. Some of its muscles are so delicate that they can be seen only under the microscope, and at the same time they are powerful enough to do a work far greater in proportion to their size than that of any other muscle in the body. It is fine, close work that puts a strain on the eyes; and so much work of this kind has come into our modern life that the demands on these sensitive organs are far more severe than the eyes of primitive man were called on to meet. As a consequence, much inconvenience or even actual illness may be due to trouble with the eyes, and it is important to know how to relieve them from unnecessary strain.

Structure of the eye. For a general idea of the structure of the eye see Figure 20 on the next page. The *iris* is a curtain suspended behind the *cornea*. In the center of the iris is an aperture called the *pupil* through which the light enters. The size of the pupil and the amount of light allowed to enter is regulated by the contraction of the muscles of the iris. Behind the pupil is the *crystalline lens*, which focuses the light as does the lens of a camera. The lens changes its shape according to the necessity for far or near vision, becoming flattened when distant objects are looked at and rounded out for seeing objects close at hand. The light passing through the lens is focused upon the *retina*, which is a delicate membrane upon which images of external objects are received. The muscles which regulate the form of the lens are so fine as to be named the *ciliary*, or hairlike, muscles. The retina is made chiefly of nerve tissue and contains a pigment that is sensitive to light.

In addition to the changes that take place within the eye for clear vision, the eye as a whole must be turned in its socket

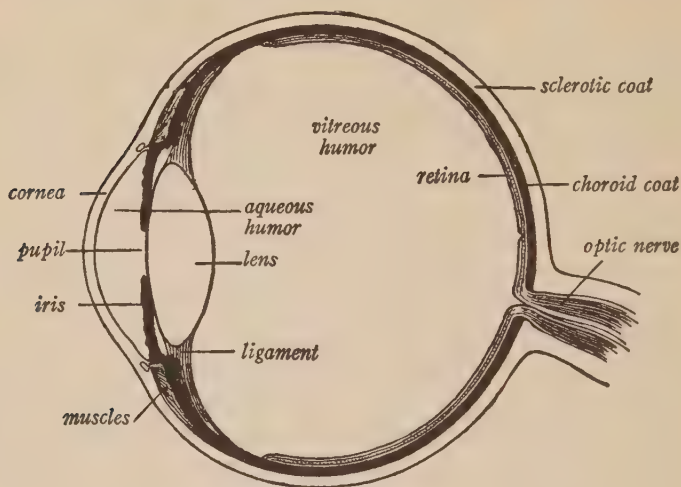


FIG. 20. A diagram showing the structure of the eye.

toward the objects we wish to examine. These movements are brought about by external muscles, six of which are attached to each eye. To look at an object held close to the eyes requires that the two eyes be turned inward and throws a strain on the muscles that cause this movement. Close work may strain the muscles that govern the movements of the eye as a whole, and also the ciliary muscles that regulate the shape of the lens.

Squinting or cross-eyedness. If the external muscles of the eyes do not do their work in such a way that both eyes are directed toward the same object, the person is said to *squint*, or to be cross-eyed. In some cases the trouble is that one of the muscles is stronger or shorter than the muscle working in opposition to it, and the eye is turned to one side. The remedy in such cases is exercises to strengthen the weak muscles or some-

times an operation on the muscles to bring them to the same length or strength.

In young children who are cross-eyed, however, the failure to move the eyes together is often not because of any fault of the muscles. The difficulty may be that one eye is near-sighted or far-sighted or is defective in some other way, so that

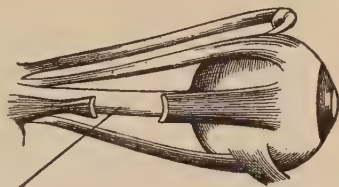


FIG. 21. The muscles that move the eye.

the image on the retina is indistinct. The visual impulses from this eye are therefore disregarded, and the eye is allowed to move about at will instead of being directed with the other eye toward objects that are being looked at. The trouble in such cases can be cured only by glasses that will remedy the refractive difficulties and cause the image to be sharply focused on the retina, and by exercises for training the eyes to work together. Glasses should be provided in the very early years of life, for if the eye is not used through childhood, the sense of sight in it is practically lost. Later an operation on the muscles may improve the appearance of the person, but it will not make the eye an efficient organ of vision. Operations on the muscles during childhood are no longer favored.

Other cases of cross-eyes are due to the fact that the brain does not fuse the images from the two eyes into one, but each side of the brain is inclined to act as an independent organ. These cases are treated by appropriate exercises, a stereoscope being used in many of them. Carrying the head to one side is an indication of eye trouble.

Saving the eyes from strain. One of the commonest ways in which the eyes are strained is working with insufficient light. A finer focus is required for distinguishing objects that are only faintly illuminated than is necessary with more light, and in factory after factory not only has output increased with the installation of a better lighting system but the strain on the

workers has been lessened. Every worker, whether in school, office, factory, or house, should try to arrange for sufficient light on his work.

Most persons can remember having read for a long time in a failing light without being conscious of a strain upon their eyes, and then finding, after resting the eyes for even a minute, that they could not see to go on. In such a case the eye muscles have gradually and with increasing effort accommodated themselves to the strain of focusing the eyes upon the page, in a light growing dimmer and dimmer. The instant that they are relieved after such a strain they relax and allow the eyes to return to their normal condition, in which reading by such a light is impossible. The effort to resume reading after the reaction subjects these muscles to a strain which is felt at once. Black absorbs all colors and hence reflects little light, and sewing on black stuff is especially fatiguing to the eyes.

A second way by which the eyes are often strained is by reading books of too fine type, or type which is blurred and indistinct. If this is necessary, the reading should not be kept up for too long a time, and the light should be good. Another cause of strain is reading in street cars or other vehicles where it is impossible to hold the page still. This should not be long continued in any case.

Reading in bed is often a strain on the eyes, not because the position of the body affects the eyesight, but because most persons reading in bed have a poor light upon the book, and frequently hold the book in an awkward position, so that it strains the muscles of the eyes to keep them directed on the page. If the book is held so as to be directly in front of the eyes as when sitting, and the light shines over the shoulder on the book, reading in bed is not particularly injurious. Most bedrooms, however, are so arranged that the light is in the center and shines directly into the eyes of the reader lying in bed. Light should never be allowed to shine directly into the

eyes. There is such a thing as too much light. A strong electric light, falling on the book in such a way as to make the page a white glare, is very bad for the eyes, and still worse is the cross-lighting in which the light from two strong lamps at once falls on the book from different directions.

Other ways in which the muscles of the eyes are overtaxed is by trying to see near objects when traveling rapidly in automobiles and by sticking too closely to work like embroidery, reading, writing, sewing, or knitting, without giving the eyes a chance to rest. Many persons have the bad habit of reading on and on in a book in which they are interested, without thought of the effect on their eyes.

There are two ways of relieving such a strain, if the taxing occupation is a necessity. One is to lift the eyes from the work as often as possible and look off into the distance. This allows the muscles to relax and rest. The other is to accustom oneself as far as is possible to work by the sense of touch. It is perfectly possible in many occupations to do the work well without using the eyes half the time. Typewriting is taught by the touch system, and as everyone knows, an experienced knitter can knit in the dark. The strain of using the eyes to follow the motions of the fingers is not only bad for the eyes but for the nervous system, which directs the eyes and receives the impulses from them.

Symptoms of eyestrain. We are constantly receiving signals from the eyes, warning us of overwork, but we have become so accustomed to this condition that we ignore the warning even when we understand exactly what it means. One of the symptoms of eyestrain is drowsiness. If, after using the eyes for a time, one becomes drowsy, it is often an indication of fatigue of the eye muscles. Other symptoms are twitching of the eyelids, or a heavy, peculiar feeling over the brows, spots before the eyes, bloodshot eyes, wrinkles from the eyes and down the middle of the forehead, and frequent headaches.

Besides the direct symptoms of eyestrain, there are various

reflex symptoms. Car sickness from looking out of car windows, indigestion, and various nervous troubles belong to this class of symptoms, and may often be cured by putting on proper glasses or having the eyes treated.

So-called "wild hairs," or eyelashes which grow in toward the eye, are an indication of inflammation of the lids. For this and for persistently red lids an oculist should be consulted. Sties are little boils, caused by germs growing at the bases of the eyelashes, and they likewise should be treated by a physician or an oculist.

Defective vision in children. It is generally believed by physicians that at least one fourth of the school children of this country have defective vision. In numerous cases such defects are not discovered until the children have been retarded, mentally and physically, by the strain undergone by the brain and nervous system in the effort to see clearly. Such a strain may cause headache, fatigue, nausea, nervousness, and irritability; and in addition to this, if the child is, like many children, too proud to admit that he does not see well, various other disadvantages may be incurred. Since the eyes of a child are used constantly at school, any ocular defect interferes very seriously with his progress in education.

Besides the difficulty of reading easily, defective eyesight entails a great strain in such lines of work as handicrafts, drawing, and blackboard work, and in many games. Many stupid and backward children, and even many insubordinate children, in schools have been transformed into normal pupils after being fitted with the proper glasses. Before children enter school their eyes should be examined, and the parents should keep watch to see that as the children grow older they do not engage in occupations tending to overtax the eyes. It is to be hoped that some day all children will be thoroughly examined physically from time to time, as part of the routine of their life, and that all remediable defects of eyes, nose, throat, or other parts of the body will be corrected early in life.

Glasses. The fitting of glasses is skilled work and should be done only by one who has had thorough training for it. A good oculist not only gives the prescription for glasses, but he examines them after they are made, that there may be no mistake. Do not go to an optician for glasses ; to do so is like going to a druggist for a prescription. Improper glasses often cause eye-strain because they are too strong or too weak, do not have the lens centered exactly in front of the eye, or in some other way do not fit the eye. Thus the eye may actually be worse off than it would be without glasses.

Treatment of the eyes. Few accidents of a minor sort are more painful than cinders or specks of dust in the eye. If when traveling in the cars one feels something in the eye, the eye should be held open, that the secretion of tears may wash the object out. If the eye is closed, the lid holds down the cinder or bit of dust and presses it into the eyeball. Rubbing the eye is the very worst thing to do in such a case. Foreign matter, such as a flaxseed or an "eyestone," should not be inserted into the eye to remove a speck. It is occasionally effective, but as a rule it tends to produce inflammation.

It is better to get the foreign particle out by washing the eye with boric acid solution or wiping the offending particle out with clean gauze or a handkerchief. If the lid is drawn back over a pencil, the speck will possibly be discovered.

A saturated solution of boric acid can be used freely for washing the eyes, and if the eyes are strained or inflamed it is soothing and healing. The solution should be carefully prepared, for if the powder is not thoroughly dissolved it may irritate the surface of the eyeball ; for this reason it is best to have it prepared at a drug store. A pipette or eye dropper can be used for injecting the solution into the eye, and this pipette should be used for no other purpose. No other solution should be put into the eyes without an order from a physician. Witch hazel, one to four parts water, which is sometimes used, is not injurious in itself ; but it is sometimes prepared with wood alcohol

instead of a pure grain alcohol, and wood alcohol is most injurious to the eyes.

When drops are put into the eye, it will cause much less pain if the lid is pulled down and the drops allowed to fall on the edge of the lid, while the patient is looking up, than if the drops fall directly into the eye. If the drops are to remain in the eye, one or two are all that are necessary, as more will run out. In taking care of an infected eye it is necessary to be very careful, as most such infections are highly communicable. It is necessary to take care, not only to keep the infection from being conveyed to the eyes of another person, but also to prevent infection spreading from one eye of the patient to the other. A fresh piece of cotton should be used for each eye in turn.

Causes of eye trouble now recognized by oculists are infections from decayed teeth, diseased tonsils, or chronic colds with infected sinuses.

QUESTIONS

1. Describe the structure of the eye.
2. Give two reasons for squinting in children and the treatment for each type of case.
3. Mention several ways in which the eyes may be strained.
4. What are some of the usual symptoms of eyestrain?
5. Why should children's eyes be examined as a routine measure?
6. Under what disadvantages do children with defective eyesight labor?
7. By whom should glasses be prescribed?
8. What is the only medicine that should be used in the eye without a doctor's order?
9. Describe the correct method of putting drops into the eyes.

CHAPTER SIX

HYGIENE OF THE MENSES

NOTHING in a woman's life is more important to her health, her mental capacity, and her powers of accomplishment than her condition each month during the menses, or monthly period. We are told by the doctors and by medical books that this is a perfectly normal function, and that the healthy woman should feel no pain and but little discomfort from it. However that may be, we all know that there are few women who are not somewhat below par at this time. It seems to a girl terribly hard to think of looking forward to this strain on her system, every month, and unfortunately most girls are so young when they first encounter this new condition in life, that they have no judgment to tell them what they ought to do. They disregard warnings, and do foolish things which cause them to suffer for years afterward. If they only understood how important the matter of taking proper care of themselves at this time really is, and how serious the consequences of neglect may be, they would not think of taking the risks that in too many cases they do take.

Age when the menses begin and cease. The monthly period usually begins between the ages of twelve and fifteen or sixteen, although in some cases it may come on much earlier and in some cases later. If its appearance is delayed beyond this age, it is best to put the girl under the care of a good physician so that he may watch for adverse symptoms and use such means as he considers necessary to bring the period on. No one except a good physician should prescribe for this condition, for medicines given by someone who has not made a thorough study of this subject may cause a condition of congestion that will bring months of suffering. There is no rule about the exact age at which the menstrual flow will cease, except that the cessation of the menses, or "change of life," usually takes place between forty-five and fifty.

Regularity in menstruation. The normal flow returns once in every twenty-eight days and lasts from three to five or six days. As in the case of the age of beginning and ending, this varies with the individual, so that no law can be stated. Each woman is a law to herself in this. It may come once in five or six weeks. I have known cases where it has been once in two months and the health was apparently normal. The only rule that can be given is, that each woman's regularity becomes established, and any variation from this in her case would be abnormal. If she has always menstruated once in five weeks and the periods become longer or shorter, her condition is abnormal, though the change may or may not be of importance.

Sometimes when menstruation begins early, it will come with more frequency and greater flow, and later in the development of the girl she may establish a different order, the period returning at longer intervals and the flow decreasing in quantity. With some women the period may last as long as eight days. This is rather abnormal and sometimes indicates a general run-down condition. With the building up of the general health, this time may be shortened.

Occasionally the period may stop entirely. This is always true during pregnancy, and often during typhoid fever, tuberculosis, and other wasting diseases. A complete change of climate or of occupation may cause a temporary stoppage. For instance, among nurses training in hospitals many cases have been known of the menses stopping for from three months to a year, with no constitutional effect. Girls going from one part of the country to another to attend school, and taking up arduous school duties, frequently miss several months. Such girls should be in the care of an experienced woman, and if the condition continues for two or three months it is best to report the matter to a physician, that he may note any adverse symptoms. Nevertheless, most physicians will do nothing to bring on menstruation, as they recognize that it should be a natural condition of the body. Should there be headache or intense

nervousness, — not merely nervous fear because the regularity of the menses has been interrupted, — bloating of the body, or other symptoms, then the physician will take measures to remedy these conditions.

Frequent causes of pain at the menstrual period. Pain at the menstrual period does not always indicate inflammation of the uterus. It may have any one of several causes, and the last thing to be done in relieving it is the treatment of the uterus itself. The uterus lies in the body between the bladder and part of the large intestine. Because of the positions of the large intestine and the uterus, pain in one is often mistaken for pain in the other. More than one case of so-called inflammation of the uterus has been found to be inflammation of the descending colon, and the trouble has been relieved by treatment of the intestine. Sometimes clearing out the bowels with an enema, or loosening the clothes, is all that is necessary to relieve the pain.

At the time and shortly before the coming of the menses the uterus becomes slightly swelled or congested, and if the lower intestine is filled with waste matter there is a pressure on this organ. This is one of the most frequent causes of pain during the period. For this reason, if for no other, the bowels should be emptied each day. Leaving the bowels full, to press against the uterus, is one of the most common causes of the falling down or misplacement of the uterus. Clothing should not be worn tight around the waist, because it presses the organs downward and tends to cause the same trouble. Pain during the period may be an indication of a run-down condition rather than of local inflammation. Many cases of so-called female trouble have been relieved by a good tonic, fresh air, rest, and a general building up of the body. If a girl suffers at the time of her menses, every attention should be paid to her general condition and health. Exercise tending to improve the general health is a good thing always, and especially in cases of this trouble. Generally speaking, varied occupation is better

than sitting still at this time. To be on one's feet all day, or to be obliged to sit or stand in one position for many hours, will sometimes cause pain when moderate exercise and some rest would not.

Work during the menstrual period. One of the first questions asked is always: Should I go to bed for a day or two during this time? If a girl is delicate, either from abnormal constitutional conditions or from some inflammation, it is necessary to give up and go to bed for a day or two. But the normal girl will find it unwise and unnecessary to cultivate the habit of giving up entirely each month. If she continues to follow her usual habits of life as far as possible, she will find that she can form the habit of doing whatever must be done, without any ill results. We are creatures of habit, and to form the habit of giving up all active life for a day or two each month means that after a while the body will be quite unable to respond to any demand at this time. There are few positions in life which a woman can fill capably if she must give up one working day each month to complete rest; for she could not depend upon herself and no one else could depend upon her for the steady work that important positions usually require.

Overwork to be avoided. In many cases there is an influx of nervous energy before or during the first part of the period, which drives the woman to exert herself beyond her strength. She must clean house, finish a dress, attend to a dozen undone tasks which all of a sudden seem of the utmost importance; and when the period really comes on she pays for all this activity by fatigue and pain. This restless energy is only a form of nervousness and should be recognized as such. All necessary work should be done, but unnecessary work or excessive exercise should be avoided. A woman who is accustomed to walking should take the car at this time if walking tires her. Gymnasium work should be discontinued for the same reasons, unless you are an instructor in a gymnasium. Even then try to do as little of it as possible.

Bathing during the period. The body must of course be kept clean, but bathing should be done with judgment. A warm sponge bath may be taken daily. A warm tub bath is not necessarily injurious, although if the body shrinks from the bath it should not be taken. Hot baths increase the flow and should not be taken unless needed. Cold baths should never be taken, as they check the flow; and a girl should not go in swimming until the period is quite over.

Wet shoes and chilling the body. Getting the feet wet is injurious, but the danger is averted if the wet shoes and stockings are immediately changed for dry ones. If, owing to circumstances, this is impossible, — as in case of getting caught in a storm, — keep on walking until the shoes can be changed, but do not sit still in wet garments. If the feet become chilled, take, as soon as possible, a hot foot bath. Put a little mustard in the water and soak the feet in it. It is not wise to take ice cream and cold drinks at this time, except in moderation, because they chill the stomach. Indigestible food should be avoided, as an accumulation of gas in the intestines will cause pain. The general rule for health as well as comfort at this time is: keep dry, warm, and properly fed, and do not get over-tired. Lack of suitable food or clothing, or exposure to cold, may induce a chilled condition, which is harmful.

Medicine during the menstrual period. No girl should take medicine or use any means to bring on or check the flow of blood. If she does this, she is running a great risk of causing acute inflammation of the uterus and its appendages. I have been appalled by the number and kinds of medicines girls pass from one to another in schools. This should never be done. Few girls know the exact effect of a medicine, and the fact that a prescription is given to one girl in a certain condition is no indication whatever that another girl apparently suffering from the same ailment needs that medicine. A physician, in giving a prescription, considers not only the symptoms detailed to him, but the constitution of the patient, so far as he can judge

of it; and he also forms his private opinion of the condition of the patient at the time and tries to make his prescription suitable to her special case. Strong cathartics should not be taken during the period, as they increase the flow and often cause pain and weakness. Apart from all these considerations, there is great danger that an unauthorized prescription may contain some opiate or drug which no reputable physician would prescribe.

The menopause or "change of life." The menopause or period during which there is a final cessation in the menstrual life of a woman occurs generally between the ages of forty-five and fifty. There are many exceptions to this rule, some women not menstruating after forty and some continuing menstruation until after fifty years of age. During the menopause only one period may be missed at first, or several months may pass without an appearance of the menses. After this interruption the periods may reappear and continue regularly for a while, the flow becoming gradually less profuse until it stops entirely. With some women it stops abruptly without premonitory symptoms and never reappears.

There is, no doubt, a tendency to disease at this time, but a woman should pass through these months without serious complications. Headache, digestive disturbances, and many nervous conditions, such as a disagreeable sensation of heat which rushes over the body at times, and which is usually spoken of as "flushes," are as a rule present. A woman may suffer also from insomnia and may become irritable and sometimes melancholy. However, the custom of attributing all unusual symptoms which may develop in a woman between the ages of forty and fifty to "change of life" has at times resulted in a failure to give the thorough examination which should have been given to determine the real condition present, of which the symptoms were an indication.

The belief that is so universal among women, that they cannot pass through these months without ill health, is one reason

for their nervous condition at this time. If a woman is healthy before the menopause begins, she should be able to pass through the period with very little discomfort. At the same time she should do all that she can do to keep herself in good health. She should be out of doors as much as possible, taking exercise enough to keep herself in good condition but not enough to over-tire her. Her diet should be simple and consist only of food that she can easily digest. She should not eat meat to excess nor drink too much coffee or tea, and should avoid all stimulating drinks. The bowels should be kept open regularly, and an occasional dose of sal hepatica or some similar salts may be taken to help relieve headache and prevent "flushes." Necessary rest should be taken through the day, and extremely late hours, excitement, and worry avoided as much as possible.

Dangerous symptoms. There are certain symptoms that may appear during the menopause that are an indication of an abnormal condition, and if they should be present, a physician should be consulted at once. These symptoms are: (1) a profuse bleeding at the time of a period, (2) bleeding between the periods, (3) the reappearance of the flow of blood some months after menstruation has stopped.

Any one of these symptoms may be an indication of some condition which can be relieved by a simple operation or (and this is most often the case) may show that there is either a tumor within the uterus or be the first symptoms of cancer. Since the only cure at present known for cancer is to remove the affected part, and since the disease is curable only if this can be done in the early stages while the condition is merely a local one, a physician should be consulted at the first appearance of any of these symptoms. Any delay in this may allow time for the disease to spread and make it impossible to cure by operation or in any other way.

QUESTIONS

1. At what age do the menses usually first appear?
2. At what age do they ordinarily stop?
3. What law of regularity does menstruation follow?
4. Mention four causes of painful menstruation.
5. Should baths be omitted during this time?
6. Why should swimming in cold water be omitted during menstruation?
7. What medicine is it permissible to take during this time without a doctor's order?
8. What is meant by the menopause?
9. What evil results may follow an invariable assumption that ill health at this time is due to the menopause?
10. Give simple directions for regulating the life during the menopause.
11. Why should an excessive amount of flow during the menopause, or a return of flow after the menopause, be reported to a physician?

CHAPTER SEVEN

CONSTIPATION

THERE are few abnormal conditions of the body more common, more serious in their effects upon the health, and in most cases more the fault of the individual, than chronic constipation. Most persons fail to consult a physician for the trouble until they have tried various kinds of remedies, and in many families or groups of persons a favorite remedy is passed around from one to another. The remedy is too often some patent medicine, made famous by advertising, of which neither the ingredients nor the effects are accurately known to the user. Such remedies give only temporary relief. They not only do not cure the disease, but often injure the intestine. Moreover, as is usual where a remedy found beneficial by one person is passed on to another, the difference in constitution may be such that the medicine will be positively harmful.

In general, cases of constipation fall into two classes, the *functional* and the *obstructive*. In the one the trouble is that the muscles in the intestinal wall are relaxed and inactive and do not force the contents of the intestine onward as they should. In the other class there is some defect or displacement of the intestine that prevents the prompt and easy forward movement of the food and waste materials. In obstructive cases often only the services of a physician can give relief; a surgical operation even is sometimes necessary. Usually, however, the difficulty is functional and the patient can be greatly benefited by a properly chosen diet and intelligent care of the health.

Symptoms and diagnosis of constipation. The usual test for the condition of the bowels is the number of evacuations daily or weekly. Most persons consider one or two movements a day absolutely necessary, others think five or six a week a normal condition. This is, however, not the sole point to be

considered. Symptoms may exist indicating a state of constipation even when there are daily evacuations. The daily movement may not empty the bowels, but may leave hard, dry feces clinging to the walls of the large intestine. There may also be what is called "latent constipation"; that is, the movement of today may not bring away the waste of yesterday, but that of two or three days before. One indication of these two conditions is the passage of hard, round lumps. Another is an occasional attack of diarrhea. Sometimes, in the midst of these soft or fluid movements, small, hard lumps will be passed.

By X-ray examination it is possible to trace food through the alimentary canal, and by taking charcoal tablets or other indigestible material and noting when it appears in the feces, the length of time that materials remain in the alimentary canal can be determined. Formerly it was thought that about two days was the normal time, but it has been found that three or four days is nearer the average.

Consequences of constipation. In addition to the symptoms that have been listed above, there are certain consequences of constipation that should be taken account of as symptoms indicating the condition. Among these are headache, sleepiness, bad dreams, dullness, indigestion of all varieties, irritability, nervousness, bad taste in the mouth, foul breath, nausea, excessive thirst, flatulency, colic, cold extremities, a frequent desire to urinate, sallow complexion, pimples on the face, and liability to colds and to hemorrhoids or piles.

Formerly it was generally believed that the headache and the general lack of health accompanying constipation were due to toxins absorbed from the putrefying wastes and foods retained within the intestine. Now a school of physicians has arisen who are inclined to attribute much of the damage to a derangement of the nervous system as a result of the constant irritation of the nerve endings by the hard and heavy fecal masses. However the effects are produced, it is certain that

they are produced. In most persons there is no question of the evil consequences of a constipated condition.

Causes of inactivity of the intestinal muscles. Any condition of ill health or low vitality is likely to cause a low tone and inactivity in the intestinal muscles. Overwork, worry, or nervousness from any cause often have the same effect; for, like the other internal organs, the intestines are controlled by the autonomic (sympathetic) nervous system. The lack of an adequate diet — one that provides all of the many different minerals, vitamins, and other substances that the body needs — also tends to cause an inert alimentary tract. Vitamin B in particular seems to give tone to the stomach and intestinal muscles (page 115).

The usual cause of functional constipation, however, in young and old, men and women, is lack of regularity in evacuating the intestinal contents. The nerve centers in control of the intestine need to be trained so that the bowels will move at regular intervals. Normally they should move once or twice each day, and if this matter were attended to regularly each day by everyone, there would be fewer cases of constipation. The right time for an evacuation is soon after eating. When food enters the stomach, it induces peristalsis — wave-like movements which pass over the intestine toward the rectum. It is much easier, therefore, to cause the bowels to empty soon after eating.

The habit of going to the toilet at a certain hour each day is frequently all that is needed to correct a mild case of constipation. This should be done whether the bowels move or not; the important thing is to choose a certain hour and form the habit of going to the toilet at that time. If it is impossible to take the time for this immediately after breakfast, as in the case of those who leave the house at once to go to their work, some other hour may be selected. Those who must go out early can train themselves to go to the toilet immediately after rising, if they will start peristalsis by drinking a glass of water.

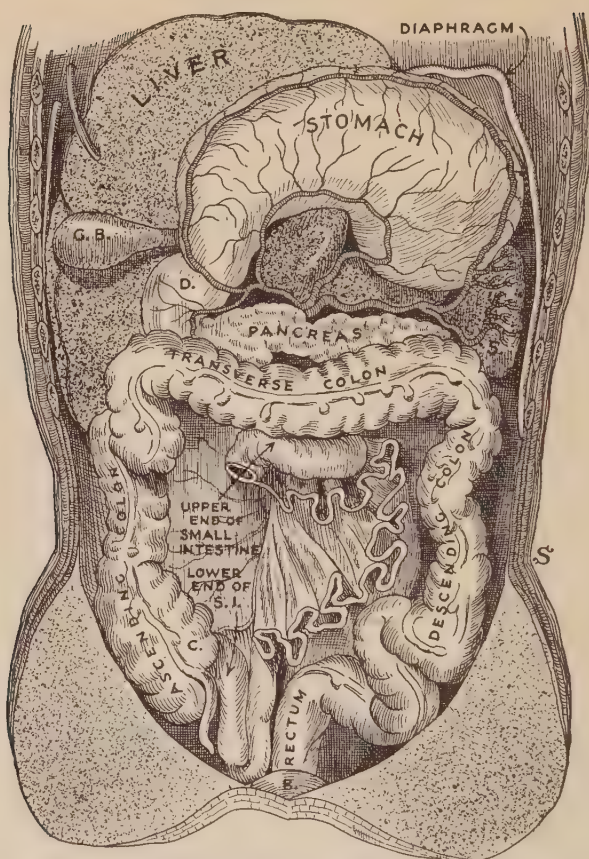


FIG. 22. Drawing from radiograph, showing the normal position of the large intestine. In the drawing the diaphragm and stomach have been lifted to show the position of the intestine. *B* is the bladder, *C* the cæcum, *D* the duodenum or lower part of the stomach, *G B* the gall bladder, *S* the spleen.

An abundance of water should be taken at night, before breakfast, and frequently throughout the day.

Enemas and cathartics are another frequent cause of constipation, since after they are taken for a time the intestinal

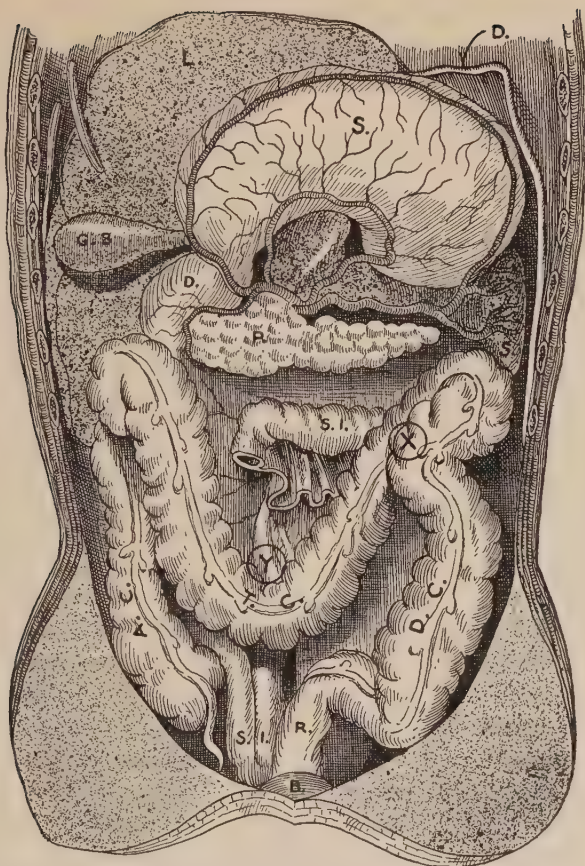


FIG. 23. Drawing from radiograph, showing position of large intestine in a case in which the abdominal organs had sunk downward. The transverse colon (*T C*) has sagged until at *Y* it is in the pelvic cavity. At *X* the descending colon is kinked sharply and is adherent to the transverse colon.

muscles refuse to respond without them. Still another cause is lack of exercise, without which all the muscles of the body tend to lose their tone. The sedentary life which many women lead especially predisposes them to this trouble, and

the old are likely to be constipated because of their lower vitality, weakness of the muscles in the abdomen and intestinal walls, lack of exercise, and the small amount of food which they take.

Constipation from displaced stomach and intestine. Constipation is sometimes caused by the stomach and intestine sagging down out of place. Normally the stomach lies up close to the angle formed by the ribs and more to the left side of the body than to the right. The large intestine, or colon, in which the waste matter from food is stored, begins on the right side of the abdomen, where the appendix is, and extends up the right side to a point under the liver, where it is attached to the rear wall of the abdominal cavity by ligaments. After making a bend, it crosses the abdomen just below the stomach and well above the umbilicus (navel) and is attached by ligaments to the left wall of the abdominal cavity. Then it bends again and goes down the left side of the abdomen to the rectum. The rectum is S-shaped, having folds and pockets which hold the substance deposited in them.

When the stomach and the intestine are held in place, the feces (waste matter of the bowels) can pass through the turns in the intestine; but when for any reason they sink out of place and the bends in the intestine are intensified, it becomes difficult for the feces to pass through the intestine. A condition of constipation then follows.

A diagnosis of this condition can often be made by examination of the general posture and shape of the abdomen, but such a diagnosis should be verified by an X-ray examination of the contents of the abdomen. Such cases are benefited by special exercises designed to strengthen the abdominal walls. Thin persons are especially liable to have sinking of the abdominal organs, and physicians often advise such persons to increase their weight, thus adding strength and thickness to the abdominal walls and causing the organs to be held more firmly in position.

Long-continued treatment often necessary in chronic constipation. Chronic constipation is often allowed to go without effective treatment because patients do not realize the length of time required for a cure and therefore become impatient and fail to coöperate with the physician. Then the physician, knowing that his directions are not being followed exactly, gives up attempting a real cure and prescribes some medicine for daily use that he knows will not injure the patient and that may do something to reduce the evil effects of the condition.

When ordinary measures fail, a thorough examination should be made by a competent physician to determine whether there is any special reason for the condition. Then, when treatment is begun, there should be conscientious and consistent coöperation between physician and patient. Almost all cases of functional constipation, even those of many years' standing, can be to a large extent relieved, if not cured, by intelligent and persistent treatment.

Diet in constipation. The proper regulation of the diet will cure some cases of constipation and be beneficial in any case. To obtain the best results, the diet should provide all the substances that the body requires. This is necessary to keep the whole body in health and to provide the nourishment that is required to keep the alimentary tract itself in health. As has been noted, vitamin B seems especially necessary. Then there must be bulk in the diet to fill up the intestine. One physician requires his patients to eat two pounds of food by weight each day. This they can do only by choosing bulky fruits and vegetables.

The diet should also contain oil, sugar, an abundance of water, and some starch and meat. Dietary changes should be made carefully, and foods which cannot be properly digested should be left out. Sometimes adding to the bill of fare one or two articles having a laxative effect and dropping some one food of constipating tendency will be all that is necessary to relieve a slight attack of constipation.

Foods allowed. Cereals: Oatmeal, cornmeal mush, cracked wheat, hominy, grits, cream of wheat.

Soups: Any soup except thick broths.

Fish: Fresh fish of all kinds, oysters (not fried).

Meat: Bacon, beef, mutton, lamb, chicken, poultry in general, squabs, game, sweetbreads.

Bread: Brown, graham, whole-wheat, corn bread, bran, and rye bread. (No toast.)

Oleaginous foods: Cream, bone marrow, oils, and butter.

Salads: Vegetable and fruit salads with plenty of good olive oil.

Vegetables: Carrots, turnips, onions, beets, cauliflower, spinach, cress, celery, peas, string beans, corn, tomatoes, potatoes, cabbage, squash, lettuce, cucumbers, asparagus, and other vegetables having in them large quantities of bulky fiber.

Desserts and sweets: Sugar, candy in moderation, honey, syrup, molasses, jellies, jams, baked apples; bread, apple, fig, and prune puddings; custards and ice cream.

Fruit and berries: All except blueberries and blackberries. (Bananas only if ripe.)

Drinks: Buttermilk, malted milk, milk (not boiled). Coffee is laxative to some persons.

Figs are beneficial if taken at any hour. Dates and prunes eaten at night before retiring will help to give a movement from the bowels in the morning.

Foods prohibited. Meats to excess, pork, liver, salted, canned, or smoked meats, too many eggs, boiled milk, or an excessive amount of milk, cocoa, and chocolate, rice to excess, farina, gruels, macaroni, thick broths, tea, cheese, nuts, blueberries, huckleberries, and blackberries.

Doughnuts, pies, crackers, and cakes.

Massage and exercises. In cases of constipation massage is of great benefit when properly given, as it strengthens the

abdominal muscles and stimulates the muscles of the intestine. A five-pound cannon ball or a bowling ball may be rolled over



FIG. 24. The ball should be rolled up the right side, across the top of the abdomen, and down the left side.

the abdomen with benefit. These balls can be bought at any store selling gymnasium apparatus. The ball should be rolled along the course of the large intestine; that is, up the right side, across the top of the abdomen, and down the left side. The abdominal muscles should be relaxed, and the best position of the body to obtain this relaxation is lying on the back, with the head and shoulders moderately high and the knees flexed.

Walking, running, horseback riding, rowing, swimming, and all such games as tennis and baseball tend to strengthen the abdominal muscles and to increase the tone of the nerve centers that regulate the liver and intestines and assist the circulation of blood through these organs. The practice of taking a few special exercises daily is a good one to establish, but these exercises should be prescribed by a physician or someone recommended by him; for if the constipation is caused by a displacement of the intestine, the exercises must be correctly selected or the displacement may be increased.

The hot-water enema. The hot-water enema, another remedy for constipation, may be very beneficial when taken under the direction of a physician who prescribes it for a certain condition, but injurious if depended upon for the daily evacuation. The physician as a rule orders the type of enema or irrigation to be given, the amount of water and medicine, if

any, to be used, or he sends a nurse skilled in this type of treatment to give it. The habit of taking large enemas, with the bag suspended very high, distends the intestine unnecessarily, washes out the natural secretions, and tends to relax the muscular walls of the intestines. If there is a tendency to weakness in these muscles, large warm-water enemas, taken constantly, may cause a state of chronic dilation.

Simple remedies. Medicines should not be taken unless prescribed by a physician, but such simple remedies as these may be used :

Water in abundance.

Half a lemon added to a glass of water and taken before breakfast will sometimes act upon the bowels. It is not injurious, and being persisted in for a week or ten days will sometimes relieve an attack of constipation.

Water with a little salt.

Oils, like olive oil or mineral oil ("Nujol," "Russian Oil," "American Oil"), lubricate the intestinal tract and cause a naturally formed movement. They can be taken indefinitely without injuring the intestine or upsetting the digestion. If the olive oil is disagreeable to the taste, season it with salt and lemon juice. The mineral oils are tasteless, but if disagreeable to take undiluted, can be added to cold water. Holding a piece of ice in the mouth just before taking an oil prevents any disagreeable taste. The dose of oil is one to two tablespoonfuls taken at night and in the morning, or only at night, according to the necessity of the case.

Castor oil is sometimes used to clean out the intestine quickly in cases of acute indigestion or food poisoning, but it is best to give no cathartic in these cases unless a physician has examined the patient to be sure that he does not have appendicitis. Castor oil or any cathartic given in a case of this kind may rupture the appendix and bring about a serious condition, and many lives are lost each year by giving castor oil and salts to those who have been stricken with appendicitis.

Cathartics and their effects. A cathartic is a medicine which causes evacuations of the bowels. Cathartics are divided into different groups, according to their effect. These groups are laxatives, purgatives, drastics, hydragogues, and cholagogues.

Laxatives are mild cathartics which stimulate peristalsis and give a somewhat softened, almost normal evacuation. *Cascara sagrada*, citrate of magnesium, glycerin, and olive and mineral oils are laxatives.

Purgatives are more decided in their effects. They increase peristaltic movement in the intestine and are followed by one or more almost liquid movements. To this class of cathartics belong aloes, compound licorice, senna, rhubarb, and castor oil.

Drastic cathartics cause active peristalsis and profuse transudation of fluid through the walls of the intestine, which results in many liquid evacuations, accompanied by griping pain in the intestine. *Podophyllum*, jalap, colocynth, elaterium, compound cathartic pills, and croton oil are the best known of these drugs.

Hydragogues produce large, watery movements caused by an excessive flow of liquids from the blood into the intestine. To this class belong Epsom and Rochelle salts, Seidlitz powders, magnesium citrate, sodium phosphate, and saline waters.

Cholagogues stimulate the liver, increase the flow of bile, excite peristalsis, and are followed by greenish liquid movements. Calomel, *podophyllum*, sodium phosphate, and blue mass are cholagogues.

Few physicians today give the more drastic cathartics except in cases of absolute necessity. Such cathartics should not be taken at all unless ordered by a physician. Cathartics of the first, second, and fourth classes, while not so injurious, should not be taken constantly, as not only do they not cure constipation, but some of them will even cause an inflammation of the intestine if taken for a long time in increased doses.

Cascara sagrada taken in large doses will in time inflame the intestine. Aloin, found in many advertised pills, will under

some conditions cause an irritation of the rectum followed by hemorrhoids. When rhubarb is taken alone in large doses, the bowel movement is followed by constipation. Senna leaves put in a bag and cooked with prunes will give moderate evacuations, but will not help permanently to relieve the constipated condition.

Castor oil is a strong purgative, but each dose is followed by constipation and it will not effect a cure of a constipated condition. Compound licorice powder has practically no curative powers.

Saline cathartics taken constantly are in the end injurious. They extract fluid from the walls of the intestine, induce intestinal catarrh, upset the digestion, cause an anemic condition, and aggravate rather than cure the trouble.

Cork, whole flaxseed, whole mustard seeds, and other indigestible substances are sometimes used. They increase peristalsis in the intestine and cause more frequent evacuations, but are very apt to start inflammation in the intestine. Regulín, a popular remedy, made of agar-agar and cascara sagrada, is the least injurious of these remedies, but even this should not be taken during a long period.

Calomel and blue mass are useful in their places, but calomel, particularly, is taken much too freely. Even when given in small doses it should not be taken frequently. Many people have what might be called the calomel habit, taking heavy doses of this drug upon the slightest excuse. Often when they decide that there are symptoms indicating the need of calomel, there is absolutely no necessity for the dose. Calomel is a derivative of mercury, and in large doses, or in some individuals even when carefully taken in small doses, it may cause symptoms of mercurial poisoning, such as nausea, abdominal pain, diarrhea, and ulcerated mouth. It has a harmful effect upon the teeth, sometimes causing a condition spoken of as *salivation*, in which the gums recede and the teeth fall out. One physician who is a specialist in digestive diseases has made the

statement that the cause of the illness of at least one third of his patients is the habit of taking calomel. It is an excellent remedy in the hands of an intelligent physician, but it is a mercury compound. Taken in sufficient amount it is poisonous, and it should be used only under a physician's direction.

Cathartics of any class should be taken only for temporary relief, except in the case of old people, where there is no chance of making a cure; and even in these cases the prescription should be made by a physician.

Hemorrhoids or piles. These are swollen veins forming small tumors in the lower intestine or rectum. They are caused by the pressure of hard masses of feces retained in the rectum when the bowels are in a constipated condition, and by straining in the passage of large masses of feces during evacuations from the bowels. One should always be careful not to strain when having an evacuation.

Hemorrhoids at times become very painful and bleed, and by their intense itching and soreness cause insomnia and irritability. Because of the pain associated with them, they prevent going to the toilet regularly, and thus become a cause as well as a result of constipation. They should be treated at their first appearance, for if neglected they may become so bad that an operation may be necessary. Sponging with cold water or witch hazel helps to relieve the itching and soreness, and if unmedicated suppositories of gluten or cocoa butter are inserted at night and left to lubricate the lower bowel, the danger of irritating the rectum at the morning evacuation is much lessened. A small amount of olive oil injected into the rectum at night will have the same result. A witch-hazel salve or unguent can also be used to allay the itching and inflammation. If these simple remedies do not relieve the condition, a physician should be consulted.

The pneumatic rubber rings that are sold in drug stores are very useful in cases of hemorrhoids. Used as cushions in chairs or on automobile seats, they prevent irritation and pain.

QUESTIONS

1. Into what general classes can cases of constipation be divided?
2. Give some of the symptoms of constipation.
3. What is meant by latent constipation?
4. Mention some of the consequences of constipation.
5. How is constipation supposed to produce its damaging effects on the health?
6. Give some important causes of functional constipation.
7. Why does sagging of the intestine and stomach sometimes cause constipation?
8. How can such cases be diagnosed, and how are they sometimes benefited?
9. Why is constipation often difficult to cure?
10. Mention some points that are important in selecting a diet for the relief of constipation.
11. What foods should be avoided if there is a tendency to constipation?
12. Give directions for treatment in simple constipation.
13. What are some of the adverse effects of enemata?
14. Why should cathartics not be given to persons who have acute abdominal pain?
15. What danger is there in the continued use of calomel?
16. What are hemorrhoids, and what causes them?
17. Give simple remedies for the relief of hemorrhoids.

CHAPTER EIGHT

EFFECT OF POSTURE ON HEALTH AND EFFICIENCY

FASHION has for so long dictated the shape of the body that many persons seem to have forgotten the reasons for its original form. They consider it only from the standpoint of beauty and as a means of showing off beautiful clothes, and, strange to say, as Dame Fashion dictates changes, our idea of beauty of form changes also; what today we consider a deformity, next year we may be working hard to cultivate. Many persons seem not to appreciate the real beauty of the well-formed body poised as it should be, or what the effect upon the health is when this poise is lost and the body has become unshapely. This lack of appreciation no doubt comes largely from ignorance of the real purpose of the body, of the wonder and beauty of its formation, and a failure to realize how by carelessness and lack of thought this intricate machine may be injured and prevented from doing its perfect work. That my readers may have a better knowledge of their bodies, I have introduced here a brief description of the human body and a discussion of the structure and proper relations of some of its organs and parts.

The human body. To the student of anatomy and physiology, the body is the most wonderful machine in the world. The more he studies it the more he realizes that every part of it, no matter how small, how seemingly unimportant, has its own special function or work, and that all the parts together make up a wonderful whole, built for the greatest efficiency. Each organ is a complete unit in structure, and each has a function that it definitely performs. Yet all the organs are built into one whole, infinitely more complex in both structure and function than any of the parts.

The framework of the body. There are in the body over two hundred bones of many different shapes and sizes. Where strength is needed, the bones are heavy. Where flexibility is

desired, they are short and small and held together by powerful ligaments and muscles. Where protection is the chief function, the bones are flat and broad like the bones of the skull which inclose and protect the brain.

In the neck and in the back of the trunk is a chain of small bones, called the *vertebræ*. Each one is separated from the next by small disks of soft, compressible cartilage or gristle, and they are held together by strong ligaments and muscles. All together they form the spinal column, which stiffens and supports the body. In the middle of this column of bones is a canal through which runs the spinal cord, thoroughly protected by the walls of the *vertebræ*. From the spinal cord, through little openings in the *vertebræ*, nerves go out to all parts of the body. The spinal column, because of the shape of its bones and the softness of its disks, is flexible — capable of being bent in any direction.

The flexibility of the spinal column continues largely through life, although not to the same extent in an adult as in a child; for through the years of childhood the disks are gradually becoming hardened and are taking the form into which they are forced by the carriage of the body. In the properly poised, erect body the disks are regular in shape, and, when looked at from the back, the vertebral column forms a straight line from the neck to the buttocks. If the body is allowed to droop forward and the shoulders and hips to become uneven, — one high and one low, — there is an uneven pressure put upon the disks between the *vertebræ*. This causes them to develop unevenly and as they harden for adult life to become wedge-shaped — thin on one edge and thick on the other. Other joints in the body also are influenced by the position in which the body is habitually held, and as all bones of the body become harder as the individual reaches adult life, the joints become set. It is therefore a hard and tedious matter to change the carriage of the body and the way the bones fit together, after adult life has been reached.

Twelve of the vertebræ have ribs articulated or joined to them, so that there are twenty-four ribs, twelve on each side. At the front of the body, all of the ribs except the two lower pairs are joined to the breastbone, so that vertebræ, ribs, and breastbone together form a framework for the chest. The bones of the shoulders are large and loosely attached for strength and flexibility. Those of the pelvis are firmly united for strength, and give support to the organs within. Attached to the framework of the chest are many muscles, among others the diaphragm, the broad muscle which separates the cavities of the chest and the abdomen. Within the cavity inclosed by the chest walls and the diaphragm are the lungs, the heart, and the large arteries and veins.

Arrangement of muscles.

There are five hundred muscles in the human body. They are arranged in antagonistic groups which work in opposition to each other. Every group of muscles has its opposing group, and these groups balance each other; for example, one group supports the back when leaning forward, another group supports the front of the body when leaning backward. If one of these groups becomes weakened from any cause such as paralysis, strain, or lack of use, it no longer pulls evenly against



FIG. 25. Poor posture. Knees are relaxed, shoulders stooped, head drooped forward; chest is flat, abdominal muscles relaxed. The weight falls back of the heels, throwing center of gravity back of body support.



FIG. 26. Faulty correction of posture. The upper part of the body is too far backward and the weight falls on the heels.



FIG. 27. Good correction of posture. The weight is well forward, chest elevated, shoulders free, abdominal and waist muscles firm.

its antagonistic group; these unopposed muscles then overpull and cause more or less change of form in the body, which may become sufficiently great to cause a real deformity.

In the properly poised body all muscles have a slight tension. Each group of antagonists is working slightly, holding the part they move poised between them, so that movements can be quickly and easily made. Professor W. P. Bowen, in his book on *Applied Anatomy and Kinesiology*, says:



FIG. 28. Bad posture. The weight is on one foot, the right hip high and the right shoulder low. This position may result in spinal curvature.



FIG. 29. Correct posture. The weight is on both feet, and the hips and shoulders are even. Note the more pleasing effect as a whole.

“Muscles that are much used are apt to have more tone than those used less ; when this is the case between two antagonists, the position of the joint upon which they act is apt to be out of normal position because of the greater tension of the one most used. Example : Women’s elbows are often semi-flexed because extensors are not used. Habitual posture depends much on muscular tone, and correction of posture is secured by improving the tone of one muscle and stretching its antagonist.”



FIG. 30. Bad posture in walking. The knees are relaxed, the shoulders stooped, the head dropped forward, and the chest flat; the waist and abdominal muscles are relaxed.



FIG. 31. Correct posture in walking. The toes are pointed straight forward, making easy the rhythmical transference of the weight from heel to sole in progressing forward.

Position of the abdominal organs. The walls of the abdominal cavity are formed by the spinal column, the upper part of the pelvic bones, the diaphragm, and the abdominal muscles. When the body is held erect, the bones and muscles form ridges or shelves upon which the abdominal organs rest. They are held securely upon these shelves by ligaments, fat, and the pressure of the abdominal muscles. In a faulty posture the

stooping forward of the body changes the position of the supporting shelves and relaxes the abdominal muscles, and the abdominal organs, lacking support, sag down from their positions. The organs in the pelvis lie below a ridge formed by the lumbar vertebræ, the pelvic bones, and the abdominal muscles. When the abdominal organs are held firmly in place, the pelvic organs are protected against pressure from above, but with the abdominal organs out of place the pelvic organs also may become misplaced.

Correct poise in standing.

In a correct standing position the feet should be straight or almost straight (i.e., toes pointing forward); the body should be swayed forward from the heel up, until its weight rests just back of the balls of the feet; the head should be held well up and back, with the chin rather low; the abdominal muscles should be tight, knees easy, and the body stretched as tall as possible. The shoulders should not be thrust forcibly back but be held rather relaxed, for if the body is correctly held in other ways the arms and shoulders will assume the positions best for them.

When standing relaxed one must be careful not to let the body become unbalanced, one shoulder and one hip high and the spine twisted, for this is one of the causes of curvature of



FIG. 32. Correct posture in walking. The abdominal and waist muscles are contracted, the chest elevated, the shoulders free, and the weight is carried well forward.



FIG. 33. The figure at the left shows bad posture in sitting. Head is thrust forward and the abdominal organs are crowded together, preventing a free circulation of the blood and lymph through them. The figure at the right shows the correct posture in sitting.

the spine. If the shoulders are held evenly balanced and the middle line of the body brought over the supporting leg and foot, the weight of the body may be taken off the other foot and leg and the foot may even be lifted from the floor without affecting the balance or the evenness of the shoulders and hips. Any change in the method of using the body is difficult and tiresome at first, but if persevered in the muscles will readjust themselves and the correct posture will become comfortable and the incorrect one tiresome.

Correct poise in sitting. When one is sitting, the body should be well back against the chair, the head up, and the chin in. In a properly made chair it is possible to sit erect or lean back without disturbing the correct position of the back and shoulders.

Effect of posture on efficiency. When the body is correctly poised it is like a perfectly balanced machine, for all its parts

are so adjusted that there is no particular strain on any one part. In addition to this the circulation is not interfered with, so that organs, muscles, and nerves are healthy and active. The lungs can expand naturally, all the organs have room to do their work, the muscles are ready, the brain is alert ; and it is a known fact that those whose bodies are poised aright are as a rule more healthy, can move more quickly, can accomplish more, and can endure much more than those whose bodies are imperfectly poised.

Causes of faulty posture. The majority of children are born straight and continue straight throughout the first years of their lives. Formerly a frequent cause of incorrect posture was the improper hanging of the clothes. Children's clothing weighed from three to five pounds, and to this weight was added the pull of the garters supporting the stockings, which were often so fastened that the full weight came on the movable shoulders. Such a weight carried for a short while meant nothing ; but when carried all day on the flexible shoulders it gradually caused them to bend forward. It was then recommended that the supporting underbodies which carried most of the weight of the clothing and to which the garters were attached should be cut to fit close about the neck, so that the strong muscles and less movable collar bone in that region, and not the flexible bones at the points of the shoulders, might support the weight.

Now clothing is light in weight, garters are seldom worn by young children, and the whole problem of clothing in relation to hygiene is much more simple.

Another cause of faulty posture is the lack of suitable chairs for children in most homes. After the days of infancy, the growing boy and girl are forced to use the chairs made for an adult. Not being able to sit back on the chair and at the same time touch the floor with the feet, they sit forward on the seat, reaching with the toes to the floor. If they wish to lean back, they do so with the upper part of the back touching the chair,

and then thrust the head forward to see to read. This position on the chair brings the shoulders forward and straightens out the natural curve of the spinal column in the lumbar region, and it becomes such a habit that often, later in life, when grown to manhood and womanhood, the person continues to sit in this way.

Some few years ago there was a great outcry against the desks used in schools. People recognized the fact that, in a class formed of children of different sizes, desks of one size could not fit all, and so adjustable desks and chairs were made. These chairs, however, are so hard to adjust that the ordinary woman teacher is not equal to the task, even if she thinks of undertaking it; and frequently no attempt is made to fit them to the height of the child. I have been told by teachers that they have taught in schoolrooms for months before they knew that the chairs and desks were adjustable, and that they had never seen any attempt made to regulate their height. If parents would insist upon the proper adjustment of desks, round shoulders would be much less common among children.

In adults, faulty posture comes frequently from sitting, standing, and walking incorrectly, and from wearing improper shoes. Postures assumed daily during work also, in many cases, change the shape of the body.

Results of improper posture. *One result of improper posture is fatigue.* The body is a delicately balanced mechanism. Any change in its balance which forces one group of muscles to support more weight than its antagonistic group causes strain, and as all parts of the body are so closely related, no one part can be strained without affecting the whole. When the body is properly balanced, with each muscle working as it should, not only is less energy required for holding the position, but all changes from the position are more easily made. In addition to this a correct posture allows the blood to circulate freely and puts no undue pressure on the nerves. But when the body is

improperly balanced, its work is done with constant strain and fatigue.

One case which came under my notice was that of a young woman, an enthusiastic art student, who suffered constantly from pain in her side and could not continue her studies because of excessive fatigue. She had been treated by first one, then another physician, and finally a doctor whom she consulted diagnosed her case as one of general ptosis or sinking of the abdominal organs. To verify his diagnosis, the physician sent her to have an X-ray taken of her digestive organs, and it was then that I saw her waiting to learn the result of her examination. I have never seen a more hopeless look on anyone's face. When I suggested that the trouble might not prove to be as serious as she seemed to fear, she broke out with: "You don't understand a thing about it. I have not been well for two or three years, am tired all the time, am constipated, and constantly suffer from indigestion. Everyone tells me it is nerves and advises me to get something useful to do, when I'm crazy to go on with my studies, and I'm just afraid that they will tell me again that there's nothing wrong. I *want* them to find something wrong, so that it can be cured and I can get well."

They did find something wrong; for the X-ray showed that her stomach and part of her large intestine were in the lowest part of her abdomen, instead of in the highest part, where they belonged. She was given no medicine at all, only rest and fattening food at first, and then later the proper exercises to return her organs to their proper position, — exercises that would correct her poise and strengthen her abdominal muscles so that the organs would be held in place. Later a second X-ray was taken which showed her stomach and intestines in normal position, and today she is a splendidly healthy woman, enthusiastic over her work, with no pain and only a normal amount of fatigue.

A second result of faulty use of the body is pain. Many cases of neuritis in different parts of the body are caused by improper

poise and improper pressure upon muscles and nerves. For example, it is now believed that sciatica comes from a slight dislocation at the articulation of the lower part of the spinal column (the sacrum) and the pelvic bone, causing pressure on the sciatic nerve. The same trouble may cause lumbago. Many physicians believe that writer's cramp and other pains in the hands and arms are caused by improper positions or straining of the muscles and nerves of the arm and shoulder. Pain in the sides and abdomen is caused by the dragging down of the organs and the interference with perfect circulation. Frequently pain is caused through the menstrual period by pressure downward upon the organs or by strain upon the back due to improper posture.

A third common result of improper posture is constipation and indigestion. When the abdominal muscles are relaxed and the abdominal organs are sagging down and pressing upon each other, not only is the free circulation of blood prevented but there may be a mechanical interference with the passage of food from the stomach into the intestine. This, particularly in children, is frequently followed by indigestion, accompanied by nausea and vomiting recurring at regular intervals, and results in imperfect nourishment of the body. Interference with the free movement of the material in the large intestine is followed by constipation.

Two nurses whom I knew, both constipated, thin, nervous, and tired all the time, one hardly able to finish her training, the other a graduate nurse who felt that she must give up her position, were helped so much by being taught to use their bodies as they should that they continued their work with interest and vigor. Anyone who has worked with these cases either as physician or gymnasium instructor could give numbers of cases where the beneficial results that follow a correction of the posture have been apparent.

The care of the feet. As foot troubles and incorrect use of the feet are frequently found associated with faulty posture and

are mentioned by some authorities as causes of faulty posture, it seems appropriate to include in this chapter something in regard to the feet and their care. There is no part of the body that becomes more out of shape from improper use and treatment than the foot, and great inconvenience, pain, and nervousness are often caused by foot troubles that could have been avoided with a little care.

The infant's foot is straight, almost what we call pigeon-toed. Each toe is as separate as the fingers. In walking, the foot is pressed well down, the toes grasp the floor, each muscle in the foot is working. Compare with this the foot of many adults, with the toes misshapen and overlapping; the big toe frequently forced under the other toes; the large joint swelled at the side; the arches flattened; and corns and calluses where there has been too great pressure from the shoe.

Flat foot is very uncomfortable, and in some cases there is the most severe pain. It is due to several causes: to improper shoes; to constantly standing on the feet, as in the case of nurses and policemen; to turning the toes out in walking, thus throwing the weight on the wrong part of the foot; to an excessive amount of weight; to jumping in games; to being on the feet too much after illness; and to a general condition of ill health and muscular weakness. It is a condition which can be helped, if not cured, by treatment. Leather supports are better than steel, but braces should be made expressly for each patient under the supervision of an orthopedic surgeon. They are used only temporarily until the muscles of the feet can be strengthened by exercises and stimulating baths. If the shoes worn are not of the correct shape, they must be changed.

Bunions are irritated joints which have been rubbed by shoes. They accompany a flattened anterior arch and a misplaced great toe which has been pushed out of the natural straight line by narrow, short shoes. Much can be done to relieve the pain in inflamed bunions by protecting them through the day with a plaster or with two or three layers of adhesive plaster with holes

cut in them large enough to encircle the joint, and by applying ichthyol salve (4 per cent) at night.

For acute pain in the anterior arch of the foot, a two-inch strip of adhesive plaster can be put around the foot just below the joints of the great and little toes and the foot. One end of the plaster should be fastened to the top of the foot near to but not quite in the middle; bring it down over the instep, under the foot, and up the other side of the foot, and fasten the second end near the first end but not quite meeting it. A plaster put on in this way forces the great toe slightly out toward the median line and gives support to the anterior arch. If the foot is to be used very much, put a second strip over the first one to give extra support.

QUESTIONS

1. Describe the spinal column.
2. How many ribs are there, and to what are they attached?
3. About how many muscles are there in the body?
4. What effect does the habit of resting on one leg have upon the spine and the general contour of the body?
5. When the body is being poised correctly in the standing position, what muscles are being used?
6. How are the abdominal organs held in place?
7. Describe the correct standing position when one is at attention; when relaxed.
8. Describe the correct sitting position.
9. Describe correct posture in walking.
10. Mention some of the common causes of incorrect posture.
11. What results may follow improper use of the body?
12. Give some of the causes of flat foot.

CHAPTER NINE

EXERCISE AND EXERCISES

WE make a distinction between exercise and exercises in this way: Exercise is what we do in our daily life, — walking and running, working with the hands, and all the movements of life, — while exercises are regulated movements that are made to accomplish a special purpose, — to develop a set of muscles or correct a deformity.

Exercise. Exercise begins in babyhood. The first thing a baby does is to cry and begin to kick his legs and move his arms; and as the days go on the baby grows, cries, and exercises his various muscles and thus helps himself to develop and grow. Later he walks and runs and is constantly on the move. A growing child will run and walk as much as an adult and sometimes, we think, more. Frequently, in trying to follow and keep up with a child, an adult becomes fatigued while the child is still fresh. This exercise is necessary for the child, to help it to grow, to exercise its muscles, to make it breathe correctly, and to keep its blood circulating. As the boy and girl grow older, they begin to play games, running and throwing a ball, and engaging in exercises of all sorts. During the school days and college days, these exercises are kept up by both boys and girls, less distinction being made today than in former years between the activities of the boy and of the girl.

When a girl leaves college there is still the same necessity for exercise, and the healthy girl should play tennis, golf, and other games, and, if possible, ride. She should systematically walk — rapidly, not loafing along — at least once a day. Many girls, upon leaving college, give up practically all outdoor life and unconsciously begin to allow their bodies to weaken from lack of use. Exercise should be taken daily in the fresh air. Indoor games, exercise in the gymnasium, or work in the house should never, except from the sheerest necessity, be substituted for outdoor exercise or sports.

Exercises. If one or more muscles are weak and the body has become deformed or weakened, a course of exercises aimed directly at the remedying of the defect should be taken. In this chapter no attempt will be made to give a set of exercises for the overcoming of particular bodily defects, as ordinarily exercises can be made to accomplish their purposes only when individual work is taken under the personal direction of an instructor. The purpose of the chapter is, rather, to emphasize the importance of corrective exercises for certain troubles and to explain why these are seldom carried out successfully in class exercises or by correspondence.

Difficulty of correcting defects by group exercises. In a large classroom it is impossible for the teacher to give such direct individual attention as is necessary to correct a deformity. In giving an exercise to a class, the instructor gives that exercise exactly as it should be done, but if, through inattention or because of not realizing the importance of the technique of the exercise, the student is careless in her work, she will not get the development from the exercise that she should. Stooped shoulders or some slight fault in posture can be corrected perfectly in a large class, by paying attention to the details of the work; but the strictest attention is required, because when doing an exercise even a slight deviation from the proper position of arms, head, or other parts of the body will affect the work of a given muscle. For instance, in an exercise with the arms, if strict attention is not paid to the line upon which the arms are to be held, the muscles will not, in that exercise, be used as they were originally intended to be. When the deformity is such that more complex exercises are required for its correction, even the attentive student is likely to make some error in carrying out the details of the exercise, and the assistance of the instructor is a necessity.

Why directions by correspondence for exercises are unsatisfactory. Taking courses in exercises by correspondence is unsatisfactory because of the difficulty of following out cor-

rectly the technique of an exercise that has not been seen. I have known persons who have worked for months trying to correct some particular weakness by taking exercises obtained through a correspondence course and who, at the end of that time, found themselves in the same condition as when they began, or worse. After these persons had used the same exercises under an instructor, they were able to develop the weakened muscles. If one attempts to use exercises without the personal help of a teacher, she should do them in front of a mirror. Here she should study out slowly and in detail each movement, and, after mastering the technique, continue to use the mirror. In this way she may, to a certain extent, overcome the handicap of working alone; but it is the very exceptional student who can work satisfactorily in this way.

Danger of continuing an exercise too long. Another reason for competent oversight in corrective exercises is that, frequently, after a course of exercises directed to strengthen one muscle has been described and used during a certain period, the time comes when the exercise should be changed because that muscle has reached its normal development. The student working without guidance may not realize this and the exercise may be continued until the muscle becomes as much too strong as it had been too weak previously, and so another deformity may be started.

The use of braces in cases of defects. In some cases braces are absolutely necessary for shoulders, feet, or any part of the body that may be out of position. These braces should always be given by a physician who has studied this work thoroughly, and, except in extreme cases, they should never be used unless they are sometimes removed and exercises taken. They give support to the body, but they do not exercise the muscles; and a brace that is constantly worn (particularly under the arch of the foot) without the proper exercise may cause a wasting away of the muscles whose movements they are hampering.

QUESTIONS

1. What is the difference between exercise and exercises?
2. When are individual exercises necessary?
3. Why is it advisable that these be given to one person alone rather than to a group?
4. Mention some of the reasons why directions given for exercises by correspondence frequently fail to produce the desired results.
5. When might the results be injurious?
6. Under what conditions are braces useful?
7. What injurious effects may follow their use, and how may these effects be prevented?

CHAPTER TEN

FATIGUE AND HOW TO PREVENT IT

EVERYONE wishes to be successful in work and to be able to get fun out of play, but many persons find themselves constantly so fatigued that they can seldom attain either of these desires. Even when there is no organic trouble, and no ailment which makes the care of a doctor or a surgeon necessary, this may be the case.

These tired persons are often heard to say, "It is natural to me to feel this way; it has always been so with me." They feel that there is a certain inevitableness about their condition, and when work drags they are much more apt to blame their own stupidity, the uselessness of the task, or the attitude of an unappreciative employer, family, or teacher, than to realize that in the strain of keeping up with the fast-moving times they have failed to eat the right food or to get the rest they need.

It is true that the connection between daily habits and general health is not always easy to make, especially when cause and effect are far removed in time and association. Yet there is a most intimate relation between right physical living and vigorous physical health, and because a tired person can neither work nor play efficiently, it is well worth while to try to avoid a tired condition.

Effect of fatigue on a muscle. The effect of fatigue on a muscle is shown by a simple experiment which most students of physiology are taught to perform.

A muscle from the leg of a frog is attached by one end to the stationary part of the little instrument used in making the experiment. The other end of the muscle is fastened to a movable, sharp-pointed arm suspended over a moving drum covered with smoked paper. Electricity is then applied to the muscle, and as it contracts from the stimulus, the pointed arm

of the instrument moves up and down on the smoked paper, making wavelike lines, the height of each wave being determined by the strength of the contraction of the muscle. As the stimulation continues and the muscle becomes exhausted, the contractions become more and more feeble and the waves

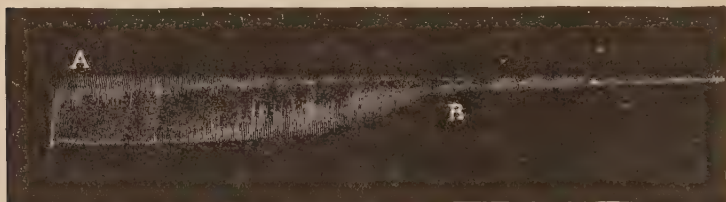


FIG. 34. A tracing made by the contractions of a muscle from a frog's leg. As the muscle becomes fatigued, its contractions become more and more feeble.

lower and lower, until finally the instrument moves over the paper in a straight line.

If the muscle is allowed to rest and then is again stimulated, the contractions will be as strong as they were before it became fatigued. Why is a muscle fatigued by exercise, and what happens during rest that enables it to regain its power to contract?

The physiology of muscle fatigue. During rest a muscle builds up and stores within itself certain energy-yielding compounds. In contraction and in the recovery processes following contraction, these compounds are broken down and supply the energy needed for work and for rebuilding purposes.

One of the important substances built up in a muscle is *glycogen*, which is starchlike and is formed from the sugar of the food. This, in periods of activity, is split up into lactic acid, and as the exercise of a muscle continues, lactic acid accumulates in it and a feeling of tiredness begins. If the contractions of a muscle are strong and are repeated often enough, sufficient acid will accumulate to cause severe fatigue. If many muscles are employed, as in violent exercise, the acid escapes into the blood and causes a general feeling of tiredness of all the muscles.

That a substance which causes fatigue is present in the blood during severe exercise can be proved by animal experiments. If blood from an exhausted animal is made to flow through the vessels of a resting animal, the second animal will show the same signs of fatigue as the first.

Recovery from muscle fatigue. During rest the muscle takes in oxygen and burns some of the lactic acid to water. Some of the energy thus released is given off as heat. Some is used to build the balance of the lactic acid up again into glycogen. A portion of it is employed in rebuilding another energy-yielding compound.

Thus a muscle becomes fatigued because of an accumulation of lactic acid and the depletion of its stores of energy-yielding materials. It regains its working power upon removal of the lactic acid and the restoration of its supply of glycogen and other energizing substances.

It should be understood that at all times our muscles have a certain amount of contraction (tonus) and that the breaking-down and the building-up processes are always going on in it. Thus the splitting of glycogen into lactic acid, the destruction of this acid, and the building up of glycogen within the muscle goes on continuously. While moderate work is being done, the formation and destruction of products may go on at such an evenly balanced rate that when the work is finished there will be no fatigue. A part of the glycogen that is used in work is formed by rebuilding lactic acid, but part of the acid is not rebuilt and there must be a constant use of food to keep the glycogen supply up to the full amount. If exercise is carried on after the glycogen supply has become exhausted, the muscle substance itself is used. Very severe and long-continued exercise may weaken the muscles rather than build them up.

Nervous and mental fatigue. Fatigue of the nervous system is not so well understood as fatigue of the muscles. The conduction of a stimulus by a nerve requires little energy, and a nerve can conduct for a long period of time without fatigue.

Yet very delicate experiments show that when a nerve is in action it uses an increased amount of oxygen, and motor nerve cells have certain supposedly "nutritive granules" that are broken down during exercise and built up during rest and sleep. It is therefore usually inferred that in the nervous elements that regulate the muscles there are breaking-down and building-up processes comparable to those in the muscle tissue.

Of the psychology of mental activity and mental fatigue we have little scientific knowledge. One psychologist has concluded from the results of experimental work that the mind does not tire by working, as muscles do, but that mental tasks become distasteful because of loss of interest in them. "We become tired *of* work and not *by* work." On the other hand, experiments have shown that the loss of a night's sleep affects the power to concentrate and to do mental work for several days. Often mental work is associated with cramping of the body from staying a long time in one position, with tiredness of the eyes, or with emotions that may affect the activity of the ductless glands; and in dealing with what we call mental fatigue, experience rather than science must be our guide.

Emotional fatigue. If we observe the persons about us we find that there are two types of individuals — those who are calm, respond slowly to stimuli, and because of their self-control make use of emotional stimulation in well-directed action; and those excitable persons, with little self-control, whose reactions are out of proportion to the importance of the exciting cause. These persons with uncontrolled emotions are uncertain in their actions, easily upset, vary greatly in their work, and often suddenly suffer great fatigue.

Emotions are related to fatigue probably because they are closely tied up with action. In emotional states the involuntary muscles are stimulated, and an increased degree of tonus is produced in them. It has been shown by experiments that while emotions are being experienced there is in the muscles

a tension which consumes oxygen only to a slightly less degree than if the appropriate movement had taken place. This may occur during such emotions as worry, anger, jealousy, envy, grief, and disappointment; and if these responses can be lessened or shortened the wear and tear on the individual will be lessened. In many cases it is possible to train oneself to ignore the irritating thoughts or circumstances that lead to emotional disturbance and thus to save one's energy for something more worth while.

If the stimulus is very great, or if the response to a weaker stimulus is too strong, even more serious changes in the body may take place. Emotional disturbances may cause a difference in the flow of blood in the brain, increased dilatation of the blood vessels, increased blood pressure, changes in the pulse and heart beat, irregular respiration, and (because of changes in the endocrine glands) an increased amount of sugar in the blood.

As a result of these body changes it is a common experience to find after a long period of highly concentrated mental effort, a spell of anger or of worry, that every muscle in the body is aching. This condition may be increased by sympathetic tensions and strains in parts of the body not consciously being used; but if all unneeded muscles are kept relaxed as far as possible, the accumulation of fatigue products will be lessened.

In spite of the fact that fatigue may follow these periods of emotion, emotional response to very strong stimuli may temporarily overcome fatigue and cause a person already fatigued to make a greater exertion than he would have been able to do if not so stimulated. For example, a mother nursing a sick child and aroused by love and anxiety will watch by the bedside day and night with practically no rest. Her recognition of the child's need makes it possible for her to ignore her fatigue and strengthen herself until the crisis is past. At the end of that time she will probably collapse from exhaustion. The

collapse is due to an actual change in the blood of the individual at that time.

It has been shown that emotions like anger and fear are accompanied by an increased amount of adrenalin in the blood, the throwing in of the increased amount being an emergency measure which enables the body to "draw upon the reserves" of stored-up strength. That there is such a thing as emotional exhaustion there is no doubt. Perhaps this is in part due to a long-continued *whipping* of the glands to unnatural activity and to the exhaustion and derangement of these organs that follows this over-activity.

The danger of over-fatigue. The energy of the human body may be compared to that of a storage battery which can deliver a great deal of energy in starting a car, but which must not be constantly called upon unless it is being persistently recharged. The wise owner heeds the sign of slow movements and dim lights, and either conserves the energy of the battery or attends to its recharging. Many inexperienced persons are like a driver with his first car, who recklessly uses up the strength of his battery; for they too use the energy which is stored in the body without providing for its renewal by rest, sleep, and correct nutrition. Unless a scheme of living has been worked out by which an individual can, by means of sleep and rest, regularly get the fatigue products out of his system, he cannot hope to be either very successful when he is working or to get the most fun out of play. Discharge and recharge of human energy should form a daily and weekly curve like the upper curve, and not like the lower curve, in Figure 35.

Of course there are times when it is necessary to draw upon our reserve energy, but this should be done only in emergencies and should not be a daily custom. If this fact could be realized and over-fatigue prevented, the individual's power of accomplishment would be increased. Excessive fatigue is physically and intellectually dangerous. In modern studies of efficiency it has been found that a few minutes of rest for the

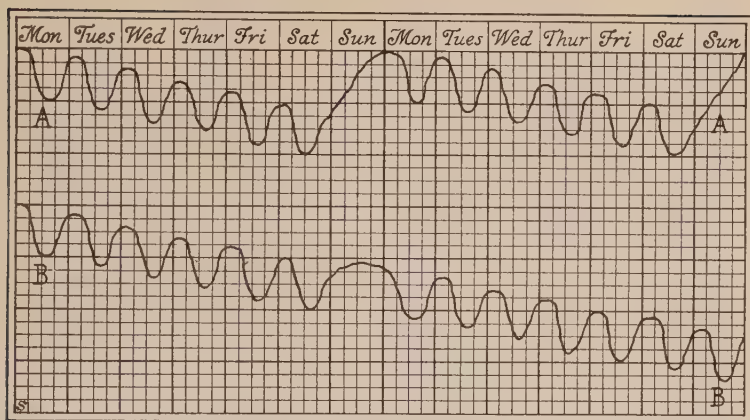


FIG. 35. The weekly curve of a person's energy should be like *A* and not like *B*. Out-of-work time should be spent so that the store of energy will be renewed.

reaccumulation of energy, taken in the midst of work, may mean increased efficiency for the remainder of the day, and that more work is often accomplished by shortening the hours of labor. A committee appointed to study the health of munition workers during the World War found that the hourly output of one hundred women who were making fuses increased 23 per cent when the weekly hours were shortened from 68.2 to 50.7, and the same committee found that the hourly output of twenty-seven men at heavy work increased 24 per cent when their hours were reduced from 61.5 to 56.2 each week.

Not only the long hours of labor but also the noise of the machines and their speed and rhythm may be sources of fatigue. As the worker becomes exhausted and consequently slower, it requires greater and greater effort for him to keep up with the steady pace of the machine.

That over-fatigue retards accomplishment is so well known today that it is the custom in many factories to give short periods of rest during the course of the morning and again during the afternoon to machine operators and, when it is pos-

sible to do so, temporarily to stop the machines. A light lunch or a glass of milk is served at this rest period in some mills. Even piece workers find that these short rests increase rather than decrease their output, and they materially decrease the number of mistakes and accidents. Quiet during rest is helpful, since noise not only irritates and exhausts the nervous system but also increases muscular tension.

Moderate fatigue not necessarily harmful. Fatigue is only harmful when it does not disappear after a period of rest. A little fatigue is easily overcome; twice the amount of fatigue will require more than twice the amount of rest. The correct plan is not to allow the danger of fatigue to cause us to avoid all work, but rather to stop before we go beyond the ability of the recuperative power to restore. This is not always easy to do, for "you may feel more tired than you are, or you may be more tired than you feel." How is one to know, then, when one is tired to such a degree that it is right to rest?

There are persons so inert that they become fatigued at the mere thought of work, even before they have started. Such persons seldom have a chance to experience the joy and peace that come with real accomplishment. It is natural to feel tired in the beginning of work, for there has been no time to "warm up." This is a feeling experienced more or less by everyone each morning, and especially each Monday morning. The need to get rid of this first feeling of inertia is recognized by trainers, who exercise their horses just before entering a race, and by baseball coaches, who never send their pitchers from the bench to the box without a preliminary warming up.

The passing from this first tired feeling to the other type of fatigue is within the experience of every girl and boy who has been on a long hike. When starting on a hike the person is much more tired during the first quarter of a mile than he is at any other time except the last part of the hike. As the body becomes adjusted he gets his "second wind," breathing is

deeper, fatigue wastes are removed more rapidly, the feet feel light, and the road is easy. But as the miles lengthen out, matters change. The fuel in the cells has decreased, the products of fatigue have increased. The legs will still move, but not so fast; the person is more apt to stumble; is not so ready to take a joke; the pack grows heavier; and he is irritated by the dust or by the peculiarities of the other hikers. Now real fatigue has come, and rest is needed.

The first tired feeling should be ignored; for exercise, to be beneficial, should be continued until there is a slight feeling of real fatigue. Even in mental work, such as studying, a little fatigue seems to sharpen the wits. It is possible, however, for one to become so interested or so stimulated by nervous or pleasurable excitement as to be unconscious of the warning signs of exhaustion.

One most important factor in preventing chronic fatigue is the use of the time out of work hours in such a way that tiredness will be dissipated and not increased. Not getting back to the original vigorous condition each week, but little by little increasing in fatigue, means eventually exhaustion, with the symptoms which accompany it — loss of appetite, insomnia, increase of fatigue disproportionate to the output of work, mental depression, loss of interest in work, lack of initiative, loss of the sense of proportion, and a tendency to worry.

Importance of suitable work. In order to prevent unnecessary fatigue the individual must not only be in good shape physically, but he must be happily placed in his work and prepared to do what is necessary to increase his skill and ease in doing it. To get into a position which one cannot fill leads to a state of indecision and worry, with a waste of energy which could be better applied to the accomplishment of the work itself or to restful recreation in preparation for the work of the next day.

Incompetence may be due to being engaged in work that is unsuited to the physical or emotional make-up of the individ-

ual, or to lack of preparation for that particular work. A small, non-muscular person who likes to do fine work should not undertake work which requires the extensive use of large muscles; one who likes to meet and talk to people will not be happy working alone; a boy or a girl who has no liking for books should not be placed permanently in a situation calling for constant study, but instead in one where he or she may learn by practical work or by contact with other persons. One with defective sight should not attempt to do work which requires close and constant use of the eyes; if lame, one should avoid work which requires him to stand. Everyone who has a physical handicap should endeavor first to be relieved from it, but if this is not possible, he should devote himself to work with which his handicap will not interfere or will interfere as little as possible.

Adjustment to new responsibility. Adjustment to new responsibility is a strain for anyone. It is especially so to one who has failed to drill himself in the many little skills which lie at the foundation of all effective work and which should be so thoroughly understood that the mind is left unoccupied by them and ready for other work. Where work is undertaken in a sincere spirit, the skills required may make the unpleasant job more congenial, as interest follows effort; and it is also well to bear in mind that most situations improve as time passes. If situated unpleasantly, one should try not to worry, but instead to do the work to the best of one's ability and to watch for a chance to change conditions. Living too close to his income, or running into debt, adds to worry and makes the worker less independent if it should be necessary to make a change.

Generally speaking, it does not pay to submit too long to the injurious effects of constantly unpleasant surroundings, and if an honest effort has not resulted in adjustment to uncomfortable or irritating circumstances, it is better to make a definite change than to continue under undue emotional strain.

Interest in work. One should learn to like his work, to put his heart into it, even if it is not the work which he would most prefer to do. It is remarkable how much interest can be taken in what is believed to be uncongenial work, if the mind is made up to like it and the best efforts are put into the doing of it. One should learn to work cheerfully, for few things are more fatiguing than nagging, fussing, losing one's temper, or exaggerating the little uncomfortable occurrences. Keeping in mind the distant reward or the improved conditions that may come from carrying on at present tasks is one of the important factors in keeping up the morale under trying circumstances.

Preparation for work. Work should not be done in a slovenly manner, but with an alert mind that is attending to the job and is constantly on the lookout for suggestions for improvement in methods and in results. Due preparation and effective control of conditions bring better results and greater speed with less fatigue. This is true in physical labor, in playing a game, in studying a lesson, or in any other activity. Well-strung rackets, elastic balls, and a level court will help in tennis; sharp pencils, the necessary paper, good light, a quiet, well-ventilated room, a suitable chair of the correct height, and whatever other conditions contribute to desk work, mean the greatest amount of accomplishment with the least fatigue. If conditions necessary for good work are arranged for before work is begun, it is not an indication that a person is fussy but rather that he is efficient. He is bringing to his problem the same intelligent adjustment that industry is paying skilled men to work out for it. One should "let the head save the heels" and remember that an intelligent laziness which accomplishes much with little effort is to be praised and not condemned.

Other points in the avoidance of fatigue. Attention to the following points may also prove helpful in preventing and recovering from fatigue:

- I. *Forgetting work.* One should learn to relax, to put thoughts of work aside, and not to worry during the hours of

rest and recreation. Yet most persons who work seem never to be able to get away from it. They have nothing to say to those not interested in their own lines, and they talk constantly to their fellow-workers of its difficulties, or gossip about some person or thing connected with it. Taking no interest in anything else, they are never rested from it. If one listens to the conversation of neighbors at the theater, or fellow-travelers on trains or boats, one finds that in any number of cases the occupation of the talker is his one interest. The minds of such persons must become narrow and fatigued.

2. *Suitable exercise.* Reasonable physical exercise should be combined with mental work. If very much fatigued from a day's work, one should not over-exercise. For instance, a teacher who has been standing all day is not benefited by a long walk; she should get fresh air by taking a ride in an open car, by sleeping out of doors, or by managing in some way to spend time in the open air without strenuous exercise.

One very great benefit of physical exercise is that it helps lift the mind from work.

3. *Eating regularly.* One of the great mistakes that women often make is that of not eating regularly and properly. The body requires food — good food at regular intervals. When shopping or when engaged in any other matter, however absorbing it may be, one should not omit the regular meal; it should be taken at the accustomed hour.

It is not wise to eat a heavy meal when over-fatigued. This, however, does not mean going entirely without food, with the idea that when the body is rested one can eat. It is much better, if one has been several hours without food, to take something simple and easily digested — a glass of sweet milk or buttermilk, a plate of broth or soup — which will cause a flow of gastric juices, and then, after a short interval of rest, to eat the meal.

One of the important medical discoveries of recent years is that many persons, both children and adults, are thin and

languid and living on a generally low physical level because lack of appetite causes them to take insufficient food. The body requires a certain amount of food to give it vigor and strength, and when meals are missed a sufficient supply of food for its needs is often not taken.

4. *Faulty elimination.* Constipation is one of the causes of fatigue. Poisons absorbed back into the body will cause fatigue, as well as other discomforts and ailments. A failure to empty the bladder at proper intervals will also cause nervousness and fatigue.

Sleep. A sufficient amount of sleep should be taken by every person, for it is during sleep that the body is restored to normal. During sleep the muscles are relaxed, respiration and pulse are slower, the secretions are diminished, digestion is slow, fatigue products disappear, and the substances required for activity are built up. The amount of sleep needed varies with the individual, some persons needing much more sleep than others. Young children should have on an average nine or ten hours. As they grow older, eight uninterrupted hours of sleep are enough, although a brief rest in the course of the day is beneficial, particularly if the child works or plays with vigor. Adults need from six to eight hours, and some persons more. Those who work hard should be careful not to cut short their hours of rest too frequently.

Insomnia. Insomnia is frequently a symptom of fatigue, brought on by overwork during the day. Worry concerning work and working too late at night will cause sleeplessness. Some persons are afraid to take a nap during the day for fear that it will keep them awake at night. This is not necessarily true; on the contrary, the rest that follows a short nap of even ten or fifteen minutes in the course of the day will often be of help in sleeping at night.

Medicine to induce sleep should never be taken unless ordered by a physician, and not then if other means can be found to prevent wakefulness. Frequently a cup of hot salted

milk or cocoa, or even simple food such as crackers, taken before retiring, draws the blood from the head and causes sleep. One should not worry too much about not sleeping, but find some means of occupying the mind pleasantly; for example, by reminding oneself of enjoyable books that have been read, of trips that have been taken, and pleasant people who have been met, or even by building castles in the air. If one cannot control one's thoughts, then it is better to turn on the light and read, choosing a short article or story, that interests but will not keep one awake to finish it. Sometimes changing the pillows, increasing or decreasing the amount of covers, taking deep-breathing exercises, or exercising the arms and legs will cause one to fall asleep. Above all, one should not worry over temporary sleeplessness, for it is frequently the nervousness of worry that brings about a long period of insomnia.

Fresh air. Many persons have reported that they require fewer hours of sleep when they spend their nights in the open air, and unquestionably fresh air is good for tired nerves. When sleeping out of doors one may use a sleeping bag to help preserve the body heat. This may be of any thickness suitable to the wearer, and can be washed when necessary. Flannel-ette blankets which can be easily washed may be used instead of sheets, and a warm gown or wrapper should be worn. Bedclothes that are too heavy are fatiguing; it is much better to provide woolen blankets and light-weight comfortables. In bitter weather it is best to cover the head and ears with a hood. This hood can be made with an opening in front for the face, and a cape to cover the neck and throat. Persons who are not in vigorous health may find it advisable to wear thick stockings or bedroom slippers when sleeping outdoors in very severe weather. A warm sleeping garment of some kind should be used to prevent direct contact with the cold bed and to break draughts of air that may penetrate between the covers. The bed and bedclothes should be of ample length or the feet will be cold. It is always to be remembered that if outdoor sleep-

ing is to be beneficial, the sleeper must be comfortable. A restless night out of doors is much less refreshing than a night of comfortable sleep indoors.

If outdoor sleeping is not practiced, one should at least have plenty of fresh air in the sleeping room. One should see that there is plenty of covering for the body, particularly for the feet; then open the windows and let in all the air possible. If a direct draught cannot be borne, a screen can be placed between the bed and the window, or something, such as a shawl or a sheet, draped across the head or foot of the bed between the bed and the window. All artificial heat should be turned off. In a house heated by a hot-air furnace of the ordinary type, there may be danger of the escape of gas; and, in any case, it is not healthful or restful to sleep with artificial heat in the room. The best-ventilated room is the one in which the air has the right amount of moisture in it and is cool and in motion. The motion of the air is more important than the proportions of oxygen and carbon dioxide it contains.

The ventilation of workrooms also needs attention, for working in a close atmosphere is very exhausting, and those who are compelled to labor in unventilated rooms often become tired and irritable. Those who insist upon excluding fresh air from an office or workroom are often selfish in preventing others from having fresh air. One should teach oneself to like fresh air, for it is an advantage rather than a disadvantage; and one should remember that those who are accustomed to working in a well-ventilated room may be greatly inconvenienced or even made sick by a close room.

QUESTIONS

1. Describe the effect of repeated contractions on a muscle.
2. Explain the physiology of muscle fatigue.
3. How does a muscle recover from fatigue?
4. Why do muscles become fatigued with ordinary mild activity?
5. What is said as to nervous fatigue?

6. What is said of mental fatigue?
7. Discuss the relation of emotion to fatigue.
8. Explain the adverse effects of over-fatigue on efficiency and how excessive fatigue may be prevented.
9. Distinguish between normal fatigue and excessive fatigue.
10. Mention some points that have an important relation to the accomplishment of work without undue fatigue.
11. Why is an adequate amount of sleep a necessity?
12. What may be done to overcome insomnia?
13. Mention some points that are important in outdoor sleeping and in providing the best conditions for indoor sleeping.

CHAPTER ELEVEN

CLOTHING

ONE of the most difficult subjects in personal hygiene is that of correct clothing for women, for as customs and fashions change, so do the opinions of those who observe and think of the effect upon the health and well-being of the girls who are so eagerly following these changes. Fortunately, however, women are today dressing more sensibly than they have done for many generations. Their clothing now gives them both freedom and comfort, and hygienic problems connected with clothing center chiefly in how and when the clothing should be worn rather than in the materials and styles of the clothing itself. Before beginning our discussion of the subject, it will be helpful to recall that physiologically the chief purpose of clothing is to retain the body heat.

Clothing and the body temperature. Properly chosen, clothing should keep the body at as even a temperature as possible. It should be adapted to the season, protecting against cold in winter and the sun in summer and guarding the skin from sudden changes in atmospheric conditions.

Clothing should also be suited to the occasion for which it is worn. A light wrap, for example, is best for a rapid walk, as a heavy wrap is tiring and apt to overheat the body ; but it is not advisable for a woman dressed for walking to stand around in the cold and become chilled.

The most sensible costume for our modern conditions of warm houses, theaters, street cars, and automobiles is one which can be altered to suit the surroundings. With a light muslin or silk dress for the house and a light wrap or heavy coat according to the weather outdoors, one can be protected against the cold outside and yet run no danger of being overheated in the house.

In hot summer weather clothing should be thin, so that as much air as possible can get to the skin to help in the evaporation of perspiration. Dresses made with open necks and with short or no sleeves help to keep the body cool. Black absorbs radiant energy and should not be worn when one is exposed to the hot sun. White clothing not only looks cooler but is cooler. Thin, loose underwear is cooler than that which fits closely.

As evaporation is necessary to keep the surface of the body cool, materials such as woollens, which absorb and hold perspiration, are heating. Indeed, all clothing made from materials taken from the animal kingdom, such as wool, silk, and furs, are warm; while that made from plant materials, such as cotton, linen, and rayon, are cooler. Loosely woven fabrics are warmer than closely woven ones; for example, wool closely woven is cooler than a loosely woven woolen material, and rayon and cotton loosely woven are warmer than these materials closely woven.

The advisability of wearing furs in the summer is questionable, for fur against the skin in summer is overheating and frequently causes an uncomfortable rash. A fur coat should be worn only in the coldest weather and should be removed in the house.

Effect of too many clothes. If the body is too heavily clothed, the effect is as injurious as if it is too lightly clothed. There is apt to be an excessive amount of perspiration which, upon the least exposure, causes chilliness and frequently inclines one to take cold. Too great an amount of clothing sometimes causes a feverish condition, the body not being able to get rid of its heat and the temperature rising above normal. Sometimes excessive clothing is a cause of drowsiness, dullness, lack of energy, and frequent headaches.

Experiments have shown that in extremely hot weather or in places where the temperature is high, much can be done to keep the body cool by removing the clothing and allowing the moving air to evaporate the perspiration from the skin.

Babies are frequently overdressed and too warmly wrapped ; in consequence they suffer from prickly heat, indigestion, and general discomfort. An overdressed baby will often be fretful from the discomfort of too many clothes or wraps.

Effect of too few clothes. If the body is not sufficiently protected, too much energy is required to keep it warm. An active person with a sufficient amount of fatty tissue, exercising vigorously and eating freely, may be comfortable with little clothing. But a thin, inactive person, wearing too little protection against changes in the weather, although she may apparently become so accustomed to the condition that she will not feel chilly, is apt to have her vitality lowered and her resistance to disease lessened. It is thought that wearing insufficient clothing is one of the principal causes of the increased amount of pulmonary tuberculosis among young women of the present day. Babies and old persons require more clothing than those in the vigorous years of life.

Feet and ankles should always be protected against wet and snow. When walking briskly, one may keep comfortably warm even with the ankles and feet soaking wet, but the danger comes when one sits down or rests. Evaporation of the moisture takes up heat and the wet parts become thoroughly chilled. Headaches, colds, and many other unhealthy conditions are caused by a failure to protect feet and ankles, especially at the time of the monthly period, when the resistance is perceptibly lowered. It is very unwise to neglect changing wet shoes and stockings for dry ones — a change that takes at most five minutes to make. If it is impossible to change — for instance, at school or at the office — then the feet should be protected with rubbers or galoshes before one goes out. An extra pair of these may be kept at the office, with the extra umbrella, so that one may always be prepared.

Effect of clothing upon posture. One of the facts which we are apt to forget is that improperly fitting or wrongly con-

structed clothes may interfere with the correct poise and use of the body.

Clothes that are too tight across the chest (either the garment itself or tightly tied ribbons) may cause a stooping position of the body in the effort to relieve the constriction, or they may limit the expansion of the lungs. Clothes hanging on the outer part of the shoulders, particularly children's clothes, may result in drawing down the shoulders and cause the wing-shaped scapulæ so frequently seen in children. This drooping of the shoulders causes a relaxed condition of the abdominal muscles, and the result is a sagging, drooping posture of the whole body. Children's clothes should, therefore, be hung from that part of the shoulder nearest the neck, and not from the flexible outer part. Garters fastened to a band around the waist drag forward the lumbar vertebræ and cause lordosis. If the supporting band is made large enough to rest on the hips, the result on the posture is much better.

Effect of tight garters. Tight, round garters just below the knee, or stockings rolled too tightly, may interfere with the circulation and cause varicose (swollen) veins in the legs. Varicose veins are not only unsightly and uncomfortable, but are sometimes quite painful; and sometimes the walls of the veins break down and sores, or leg ulcers, which are painful and hard to heal, form along the veins. Those persons who are on their feet a great deal should be particularly careful not to wear constricting garters.

Corsets and brassières. At the writing of this book, corsets are being worn hardly at all, a custom considered by the majority of physicians as a most healthful one. However, with the constantly changing styles and the apparently blind way in which many persons follow the dictates of fashion, we do not know how long this custom will continue, and it therefore seems well to point out certain facts which have to do with the wearing or not wearing of corsets.

One of the results of doing away with a corset is that all

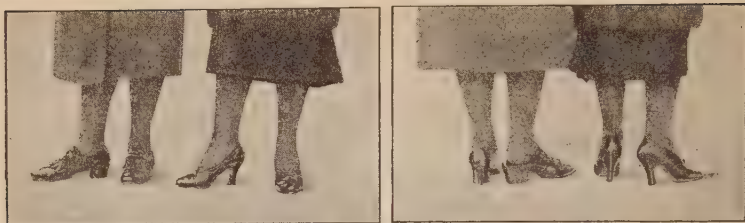
support is taken from the abdominal muscles and organs. Of course an artificial support should not be necessary, for the abdominal walls are so constructed that with well-developed muscles in them and with correct posture they should need no assistance in holding the body upright and the organs in their places. But in the sagging, drooping posture which so many young girls affect, support is not given to the organs, and in many cases digestive disorders and long and painful menstruation are caused by the crowding together of the various organs in the abdomen and the consequent interference with the circulation.

It has been found necessary in many cases of ill health and a generally run-down condition to use surgical belts to support the organs which the abdominal muscles are not supporting. A return of the corset is not to be desired, but women and girls must be made to realize the absolute necessity of keeping the body erect and of preventing the abdominal muscles from sagging and becoming weak.

Brassières should be worn to support, not constrict, the breasts, for tight brassières worn to press the breasts down may not only cause an unsightly sagging of the supporting muscles, but may injure the breasts.

How to know good shoes. The injury that is done to the feet by the type of shoes usually worn by women is so well known to them all that it is not necessary to enter into the discussion here ; but, as so many women who wish to wear the proper shoes understand so little about them and find them so difficult to buy, a description of a shoe built along the proper lines will be given.

(1) A shoe of the right shape and size should fit closely at the heel and about the arch, but *it should be long enough and broad enough* for the foot, giving ample room for the toes. The arrangement of bones and muscles in the foot is such as to make the foot both strong and flexible. This arrangement makes the foot compressible, and it can be forced into a shoe



FIGS. 36-37. Common-sense shoes and a pair of slippers with French heels. The illustrations that follow show the effects of high heels and pointed toes on the bones of the feet.

much too small for it. A corn or even a red spot on the foot is an indication of an ill-fitting shoe. A woman will suffer in her feet pain and discomfort which, located in any other part of her body, would drive her quickly to a physician for relief. We have all seen many women wearing shoes which bound and injured their feet.

(2) *A properly fitting shoe* must have the shape of the foot upon which it is to be worn. As feet vary in shape, some being straight, some flaring in or out, the shoe must be chosen to fit the particular foot upon which it is to be worn.

(3) The heel should be of the proper height to suit the wearer. A mistake that is frequently made is to change too suddenly from a high to an excessively low heel, for the muscles of the leg and foot that have grown accustomed to a high heel are strained by this sudden change. This is one reason why so many persons find it difficult to wear a "common sense" shoe without experiencing fatigue and pain.

It is doubtful if it is best for one beyond middle age to try to make a radical change in the style of shoe which has been worn for many years, but a young person should increase the flexibility of the calf muscles by exercise until any height of heel can be worn.

Many students find it difficult to wear gymnasium shoes at first because of the strain which the low heel causes. If there is difficulty in wearing this type of shoe, a lift should at first be



Army Medical Museum

FIG. 38. X-ray of woman's foot in slipper with French heel. Note the distortion of the bones of the foot. Such shoes cause backache, headache, and nervousness.



Army Medical Museum

FIG. 39. X-ray of woman's foot in ordinary shoe with pointed toe. The great toe is turned inward, and the joint at the base of the great toe is enlarged.



Army Medical Museum

FIG. 40. One type of shoe recommended for women by the American Posture League. The inner edge is straight, and there is adequate room for the toes.



Army Medical Museum

FIG. 41. X-ray of foot in United States Army shoe. This shoe gives ample room for the toes, and the bones of the foot are in normal position.



FIG. 42. The arch of the foot, and how a high heel props it up on end.

put on the heel of the shoe and this gradually made lower as the muscles become accustomed to the change.

QUESTIONS

1. Describe sensible clothing for winter.
2. Describe sensible clothing for summer.
3. Why are too many clothes injurious?
4. Why are too few clothes injurious?
5. Why do wet clothes, if left to dry on the body, chill it?
6. How does the clothing affect posture?
7. Why should tight garters not be worn?
8. Many physicians today are ordering the wearing of surgical belts by some women who no longer wear corsets. What condition of the body causes the necessity for this belt?
9. How can this condition be prevented?
10. How may brassières be injurious?
11. Give three points which should be considered when selecting a shoe.

CHAPTER TWELVE

FOODS AND NUTRITION

“AMONG all the hygienic factors which influence the welfare of the human being, the nutrition factor stands first in importance.”

“The health, growth, and physical development of children, and to a considerable degree their mental and moral development, depend upon their nutrition.”

The first of these statements is made by Professor E. V. McCollum, the results of whose researches on foods are incorporated in the teaching of every medical school in the world, and the second is by Dr. L. E. Holt, the eminent child specialist. In common with all progressive physicians and students of nutrition, these authorities hold that the subject of food selection has not been treated with sufficient seriousness.

What an adequate diet must supply. Food must first of all furnish the energy required by the body machine — heat and strength for work.

Food must also furnish the materials that the body needs for its growth, repair, and life. These materials include the proteins that are so extensively used in tissue building; the substances from which the glands build their secretions; the many different kinds of minerals that enter into the composition of the tissues or secretions or are dissolved in the fluids in which the tissues are bathed; and the vitamins that, like the secretions of the ductless glands, seem to function as chemical regulators of the body.

In addition, the food must furnish enough bulk to fill up the intestine and cause the wastes to be promptly moved along the alimentary tract and eliminated from the body.

The energy in foods measured in Calories. The energy in a food is determined by measuring the amount of heat that a given weight of the food yields when burned. In making these

measurements metric units are used ; the unit of weight is the gram, and the heat unit is the Calorie.

A gram of fat, when oxidized, yields about 9.3 Calories¹ of heat, and a gram of carbohydrate (sugar or starch) 4.1 Calories. The proteins likewise yield to the body about 4.1 Calories for each gram of dry weight.²

The energy requirements of the body. A person must have enough food to meet his basal metabolism requirements (page 167). He must also have enough additional food to furnish the heat that is lost from the body and to carry on his body activities.

The basal metabolism requirements vary with sex, age, body build, and weight, and the additional energy requirements vary with the amount of work done and with the exposure of the body to cold. No exact rule as to the amounts of food required can be given, but the following table shows average amounts under average activity and conditions.

If not enough food is supplied, the body oxidizes its own tissues to get energy, and there is a loss of body weight. If more food is taken than the body can use, the surplus is stored and there is a gain in weight.

The protein requirements of the body. In digestion the protein molecules are split into *amino acids*. These are absorbed into the blood and used in the body as building stones in the growth and repair of the tissues.

Different kinds of proteins yield different amino acids and

¹ A calorie (spelled with a small *c*) is the amount of heat required to raise the temperature of 1 gram (1 cubic centimeter) of water 1° C. This is the unit of heat used in physical measurements, but for convenience in physiological work a unit one thousand times as large is often employed. This is the Calorie (spelled with a capital *C*) and is the amount of heat required to raise the temperature of 1 kilogram (1 liter) of water 1° C. In the discussion of foods and nutrition in this text, the energy values and requirements are given in Calories.

² In the body the proteins are not completely oxidized, and some of the protein wastes (*e.g.*, urea, uric acid) still contain some energy when they are excreted from the body. The heat values given for protein foods in this text show the energy values of these foods to the body, and not their total values.

APPROXIMATE CALORIC VALUES REQUIRED IN HEALTH

AGE	CALORIES PER POUND	TOTAL IN 24 HOURS
1	40 to 50	350 to 450
2	40 to 45	900 to 1100
3	38 to 43	1100 to 1300
4	35 to 40	1300 to 1400
5	34 to 39	1400 to 1500
6	32 to 38	1500 to 1600
7	32 to 38	1600 to 1700
8	32 to 38	1700 to 1900
9	32 to 38	1900 to 2100
10	32 to 38	2100 to 2300
11	33 to 38	2300 to 2500
12	33 to 38	2700 to 2900
13	33 to 38	2900 to 3200
14	32 to 38	3200 to 3400
15	28 to 38	3300 to 3900
16	26 to 36	3200 to 4100
17	24 to 33	3100 to 3900
18	23 to 30	3000 to 3700
Adult	18 to 24	2600 to 3300

yield them in different percentages ; so no hard-and-fast rule as to the amount of protein that is necessary can be given. In general, the animal proteins like meat, milk, and eggs yield all the different amino acids needed, and a smaller amount of these foods than of vegetable proteins will supply the body's requirements. Certain amino acids that are required for growth are not necessary for maintenance, and children especially need milk or other proteins of animal source.

In an ordinary diet, from one sixth to one tenth of the Calories should come from the protein foods.

Fats in the diet. The fats and oils furnish the most concentrated source of energy, and they therefore have high value as fuel foods. Further, three of the seven known vitamins dis-

solve in fat rather than in water, and to obtain a supply of these vitamins, fats must be eaten. However, too much fat, especially in hot weather, causes digestive disturbances in many persons, and 100 grams of fat daily (not quite 4 ounces) is considered a liberal allowance in the ordinary diet.

Milk, cream, and yolk of eggs furnish fats that are high in vitamin content. Cod-liver oil is rich in vitamin A, it is one of the few concentrated sources of vitamin D, and it is particularly beneficial to children. Vegetable oils and fats, such as corn oil, cottonseed oil, olive oil, coconut oil, crisco, and nut butters, furnish energy but are lacking in vitamins. Green leaves usually contain some oil that is rich in vitamins.

Carbohydrates. The carbohydrates include the starches and sugars. They are eaten in greater amounts than any other foods and are easily digested if the digestion is normal. They produce energy and supply a large part of the Calories required. The two great sources of carbohydrate supply for the body are sugar and starch from grains and grain products and from vegetables.

In many households carbohydrates are used to excess, particularly by the children. It is so easy to feed children bread and butter or jam, cereals with sugar, rice, potatoes, macaroni, and other similar foods, that unless one watches carefully there is great danger of feeding an excess of carbohydrates and not enough fats and proteins. Also, certain individuals, by eating candy and sugar, take carbohydrates far in excess of the advisable amount. In a well-balanced diet for a moderately active person, about one half of the Calories required are obtained from carbohydrates.

Minerals in the diet. Certain mineral substances must be supplied by the diet. Of these, common salt is required in the greatest amounts. Calcium, iron, and phosphorus are necessary also, as are small amounts of potassium, magnesium, copper, iodine, and a number of other elements.

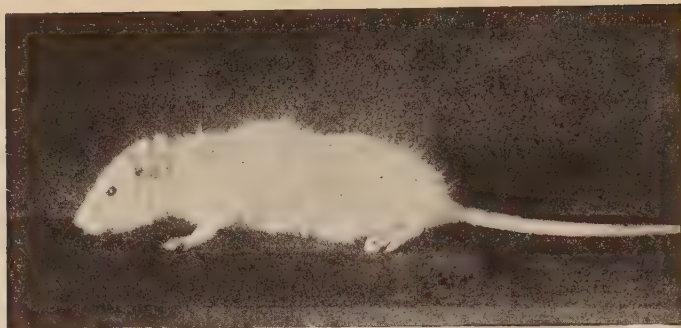
In general these elements are most abundant in milk, eggs, whole grains, and vegetables. Fats and sugar supply none of them. The percentage of the mineral elements in foods varies in different regions according to the chemical composition of the soil, and it has been found that wheat grown with an abundance of water has almost twice the mineral content of wheat grown in the same soil with a scant water supply.

In many places it is customary to add to the food of growing animals bone meal (which contains calcium and phosphorus), wood ashes, or a mixture of minerals to furnish any elements which may be lacking in the food. To human food salt is customarily added, and in certain regions iodine (page 170). Perhaps in future we shall make sure of a complete mineral supply by artificially adding to the diet such mineral elements as the food may not furnish in sufficient amounts.

Vitamins. Through experiments in animal feeding it was found that an animal could not live on a diet of purified protein, fat, carbohydrate, and minerals. Certain other substances necessary for life are in foods. For example, a diet in which fat is supplied in the form of butter will keep an animal in health, but if the butter is replaced by lard or olive oil the animal dies. Evidently the butter contains something that the lard and olive oil do not contain.

These substances are called *vitamins*. They are present in foods in unbelievably small amounts, but they are as necessary for life and health as the substances that are required in larger quantities. Vitamins affect the growth of plants and of bacteria and yeasts as well as that of animals. More than a score of them are known, seven of which have been studied in connection with the nutrition of man or the higher animals. These are usually spoken of as vitamins A, B, C, D, E, F, and G. Of these, all but E and F are known to be necessary in human nutrition.

Vitamin A. This vitamin is found in the fat of milk (cream, butter, and cheese), yolk of egg, beef fat, liver, kidney, and in



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FIG. 43. This miserable-looking rat had before him at all times food that would supply everything needed except vitamin B. Each day he ate less and less and at the end of a month was about to die. Then he was supplied with the lacking vitamin, with the results shown on the next page.

cod-liver oil. It is present in leafy vegetables, being especially abundant in spinach, and oranges and tomatoes are quite rich in it. It is not found to any extent in most grains or grain products, although yellow corn is quite rich in it. An interesting fact is that vitamin A is usually associated with yellow color in vegetables; it is present in carrots, sweet potatoes, and yellow turnips, but is not found in white potatoes or white turnips.

The retina of the eye is affected by a lack of vitamin A, and inability to see in a weak light ("night blindness") is a recognized symptom of vitamin A deficiency also. Without a sufficient supply of the vitamin, the skin becomes rough and dry and the cells of the mucous membranes undergo a shrinking and hardening process.

The membranes in this condition lose their protective power against germs, as is shown by the fact that a common effect of a low vitamin A diet in laboratory animals is infection of the eyes and of the sinuses and respiratory passages. Many physicians consider an abundant supply of vitamin A important as a protection against infections of the tonsils, sinuses, kidneys,



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FIG. 44. Within a few hours after receiving the vitamin the rat was again eating and in 24 hours was running about. A few days later he was in good flesh and afterward grew at the normal rate.

and other parts. Four times as much vitamin A is required to keep up the resistance of rats to germs as is necessary for satisfactory growth. An infection increases the amount of vitamin A that is required and quickly depletes the body's reserves of this essential substance. Persons with sinus trouble, bronchitis, or other chronic infections require an unusually abundant supply of it.

Vitamin B.¹ This vitamin is found in yeast, eggs, the germ and bran of grains, nearly all vegetables — especially potatoes, beans, peas, spinach, cabbage, carrots, and turnips — and nearly all fruit juices. Oranges, grapefruit, lemons, and bananas are good sources of vitamin B. It is found also in milk, nuts, eggs, honey, lean meat, liver, kidney, heart, and unpolished rice. Polishing rice removes the germ and bran in which the vitamin is stored; so rice as it is usually eaten is destitute of it.

Without a sufficient supply of vitamin B the appetite fails, growth in young animals ceases, and there is a general decline

¹ What was formerly called vitamin B was found to be not a single vitamin but a mixture of several of them. One of these, the anti-neuritic, was allowed to retain the name vitamin B, while two others have been designated F and G.

in health and nutrition. If the deficiency is great enough, there is degeneration of the nerve fibers and a weakened and paralyzed condition. Often vitamin B is spoken of as the anti-neuritic vitamin, because the lack of it shows its effect so markedly upon the nervous system.

In Japan, India, and the Philippines, and in other countries where polished rice forms a large part of the diet, a disease believed to be caused by lack of vitamin B is common. This disease is called beriberi¹ and it has occurred also among sailors, and among the inhabitants of Labrador, when their diet consists chiefly of white flour and salt meat. In our own country beriberi is quite unusual, but it is believed that a lack of vitamin B is not so uncommon in the diet of babies. Certain persons of delicate appetite, who live on restricted diets, also probably fail to get it in sufficient amounts. Since a deficiency of it causes immobility of the whole digestive tract, an extra supply of this vitamin is sometimes recommended in the treatment of loss of appetite and of constipation. It seems to have been proved that vitamin B and also vitamin G are necessary for the secretion of milk; so the nursing mother should have a liberal supply of these substances.

Vitamin C. Vitamin C is found chiefly in fruits and vegetables. It is abundant in oranges, lemons, grapefruit, and tomatoes. It is found also in cabbage, turnips, onions, lettuce, apples, potatoes, and nearly all fresh plant foods. It is present also in milk, eggs, and fresh meat, but these animal foods do not always supply it to the body in sufficient amounts.

Without vitamin C the cell walls in the body tend to break down, the walls of the small blood vessels become soft and spongy, and the gums bleed easily. There are hemorrhages under the skin and in the joints, and a condition known as *scurvy* appears. This disease is characterized by pains in the

¹ Some investigators believe that beriberi is caused by a germ, and that the lack of vitamin B causes the disease by lowering the resistance of the body to this germ.

joints and lassitude, and if it advances sufficiently the gums become spongy and the teeth loose.

Formerly sailors suffered much from scurvy, and in parts of the earth where the winters are long people often suffered from a lack of vitamin C during the late winter months. The first symptom in an animal that is deprived of this vitamin is a defective growth of the teeth, and it is now believed that one of the most important causes of soft teeth and tooth decay is lack of vitamin C in the diet.

A modified form of scurvy may appear in children when the vitamin C supply is low but not entirely lacking. The symptoms are a general malnutrition, irregular teeth, poor development, with round shoulders, flat feet, and narrow chest. Adults have a similar condition, the symptoms being poor health, constant depression, and premature age. Nursing babies may develop this condition because of a lack of fruit and fresh vegetables in the mother's diet. Carefully balanced feeding will prevent and cure these conditions. Quite young infants are given orange and tomato juice, and purées of vegetables may be included in the diet of a child before it is a year old.

Vitamin D. Vitamin D is the sunshine vitamin. The only foods in which it is found abundantly are yolk of eggs and liver. When there is a lack of this vitamin, calcium and phosphorus are not absorbed and used properly by the body.

When ultra-violet rays fall on the skin, vitamin D is manufactured in the body. During the summer months, when these rays are abundant in the sunshine and the warmth makes it possible to wear clothing that exposes the body to the sun's rays, it is not so necessary to have vitamin D in the food. But if this vitamin is not supplied, or if ultra-violet rays do not reach the body, there is trouble in the calcium metabolism. In children the result is rickets, a condition in which the bones are soft and do not have a normal amount of lime in them.

Formerly rickets was one of the commonest of all diseases,

the great majority of younger children in our Northern states suffering from it during the winter months. Now cod-liver oil and treatment with ultra-violet rays are in large part preventing the disease. Foods that have been irradiated with ultra-violet rays have vitamin D formed in them, and these foods may be used in place of those which naturally supply the vitamin.

Laboratory animals fed on diets lacking in vitamin D in many cases have calculi (stones) in the kidneys and bladder. For a normal calcium metabolism, and a state of general well-being, this vitamin must be supplied.

Vitamins E and F. These vitamins have not been thoroughly studied, but their existence has been proved. Vitamin E is known as the anti-sterility vitamin. If there is a lack of it in an animal's diet, no young are produced. The vitamin is necessary for the life and development of the embryo, and probably necessary also for the health of some of the adult tissues. It would seem very important for an expectant mother or one nursing an infant to be careful to include in her diet foods containing this vitamin. It is fat soluble and is found in the germ of wheat and corn, in whole-grain products, in green leaves, and also in liver and kidney. Vitamin F is even less known, but there is a substance associated with vitamin B, although distinct from it, that is necessary for the growth of pigeons.

Vitamin G. Until recently the cause of pellagra was unknown, but it is now believed to be the lack of a food substance. This substance was for some time referred to as the P-P (pellagra preventive) factor, but it is now called vitamin G.

Pellagra is a disease of the skin, mucous membranes, and spinal cord. It occurs most frequently in southern Europe and in the rural sections of the southern part of the United States, but it is appearing more commonly among the poor of our cities. The first symptoms are digestive disturbances, followed by weakness and debility. In severe cases there are

spinal pain, convulsions, and sometimes a condition of melancholia and idiocy. There are sore mouth and a characteristic eruption and a general redness of the skin, followed by peeling.

Vitamin G is contained in fresh animal protein, such as milk and meat, as has been shown by experiments on animals and human beings. Cases of pellagra have been cured by adding to the diet an abundance of these foods, without making any other change in food or living conditions. This vitamin is also present in great abundance in yeast, and in some of our Southern states yeast has been widely distributed by boards of health to prevent pellagra among those unable to secure a proper diet. Tomatoes, collards, and turnip greens contain the vitamin. Wheat flour, corn meal, sweet potatoes, molasses, and fat salt pork lack it.

Necessity for a balanced diet. The fact that stands out above all others in modern dietary studies is that an overabundance of one nutrient does not compensate for the lack of another. There is an imperious demand for each one of many different food substances, for which no substitutes are accepted. A diet must therefore be balanced. It must contain *all* the substances essential to the body, — proteins, carbohydrates, fats, minerals, vitamins, and roughage, — and these constituents should be blended in the right proportions.

Just what the right proportions of the various food elements should be varies with the age and activity of the person and with his exposure to cold. A rapidly developing child needs large amounts of building materials and the vitamins that will enable him to use these. A man at hard work needs an abundance of carbohydrates for muscle fuel. Each age and each individual have different food requirements; but at any age a diet may be 99.99 per cent correct and complete, and yet, because of error in the remaining one hundredth of one per cent, it may be inadequate to sustain life.

The marvel is not that malnutrition is so common, but that it is not more common than it is.

Concentrated vitamin preparations are now extensively sold, and while a person on an abundant and balanced diet should not need them, there are doubtless many to whom these preparations are beneficial. Those with digestive disturbances do not always utilize in full the vitamins provided by the diet. Old persons and persons of feeble appetite often take foods in too small quantities to provide an adequate vitamin supply. Chronic infections call for an unusually large intake of some of the vitamins. Only beneficial effects seem to follow the taking of vitamins in any ordinary amounts.

QUESTIONS

1. What must an adequate diet supply to the body?
2. How is the energy in food measured?
3. What is meant by the energy requirements of the body?
4. What foods are rich in proteins, and how do animal and vegetable proteins differ?
5. What per cent of the calories in the food should be furnished in proteins?
6. Why are fats necessary to the body?
7. In what foods are the carbohydrates found?
8. What minerals are necessary to the body, and in what foods are they found?
9. What are vitamins?
10. What is the effect of vitamin A, and in what foods is it found?
11. In what foods is vitamin B found, and why is it necessary to the body?
12. What effect upon the body does the omission of vitamin C have?
13. From what source is vitamin D obtained?
14. What common disease is caused by the lack of vitamin D?
15. What is pellagra, and what foods will prevent it?
16. What is meant by a well-balanced diet?

CHAPTER THIRTEEN

THE FEEDING OF CHILDREN

WHEN we consider all the different substances required by the body and the difficulty in supplying them in their proper proportions, it at once becomes apparent that the responsibility which rests upon the person who selects the daily food for a household is very great. To do this efficiently, both scientific training and resourcefulness are necessary. The task requires a knowledge not only of the physiological needs of the body and of food values, but also of where to get the foods that are required. Anyone who succeeds in supplying appetizing and adequate food combinations to her family three times a day, year in and year out, has a right to take pride in her achievement; for in many families the problem of satisfactory nutrition has not been solved. Especially is there room for improvement in the feeding of children after they have passed the nursing stage.

Improvement in infant feeding. In the feeding of infants great improvement has been made in the last few years. Public attention was directed to the large number of deaths occurring before the end of the first year, and physicians and scientists set themselves to the task of finding just what the nutritional needs of infants are and how these needs can be safely and fully met. Then the work of educating mothers and infants' nurses in proper methods of feeding was most actively carried on by physicians, trained nurses, and societies formed for that purpose. The results have been marvelous. For example, within ten years in New York City the death rate of infants was reduced one third.

It is today a very ignorant or careless mother who does not procure proper food for her infant; for all the various protein, carbohydrate, vitamin, and mineral requirements of the infant have been studied and provision made for meeting them with

a minimum amount of trouble and expense, while instruction and advice as to infant feeding are available to all. Cod-liver oil of tested strength can be used if there is a deficiency of vitamins A or D; orange juice or tomato juice will supply vitamin C; while preparations made from yeast and wheat germs are rich in vitamins B and G and can be added to the food to enrich it in those factors.

Malnutrition in older children. The nutrition of children who are old enough "to eat" is in a much less satisfactory state. During infancy the amount of food that the baby takes is most carefully measured, the type of food is considered, and the hours of feeding are regulated by the clock. But after the child begins to take solid food this care is no longer exercised. General consideration is, of course, usually given to the amount of food consumed, and foods that are absolutely unsuitable are not allowed; but in many homes children are expected to take their meals with the family and to select their food from what the family eats.

This results in many cases of malnutrition, for the food requirements of a growing child are different from the requirements of an adult in whom growth has been completed. At the time when the body is rapidly increasing in size, and the second teeth are being built, a child must have an abundance of certain foods that an adult may omit from his diet or take only in small amounts without serious injury. The failure to understand this fact is responsible for much of the malnutrition that is found in children of school and pre-school age.

One reason for the neglect of children between the ages of two and six is that the effects of improper feeding do not show as quickly and unmistakably as they do in infancy. A second reason is that many persons do not realize that slow growth and lack of energy in a child are indications of a defective diet. Often the explanation that a child is "quiet" or "never has been a large eater" is accepted without a realization that a normal child is neither quiet nor abstemious, and that in the

diet of children who are thin and listless and lack appetite there is probably a deficiency of the elements in the food that stimulate hunger, increase vitality, and provide materials for growth and energy for activity.

Symptoms of malnutrition. Children who are undernourished or improperly nourished do not grow as rapidly as they should. They are pale and anemic, they may be dull and backward in school, and they lack "animal spirits" and ambition for either work or play. Some of them are nervous and fretful, eat and sleep badly, cannot concentrate mentally, and are hard to manage. Some have poorly developed bodies, round shoulders, and flat feet, and are especially prone to contract colds and infections. If a child has any of these symptoms, both the quality and the quantity of the food should be investigated.

All children should be weighed and measured regularly and a record of their weight and growth kept, so that any abnormality can be detected. Overweight of too great an extent should be considered an abnormality, as well as underweight, as in some cases it may occur to such an extent that it may interfere with exercise and other normal living conditions, and it may indicate unbalanced secretions from the endocrine glands.

Causes of malnutrition. The great cause of malnutrition is the lack of something that the food should supply. Therefore the first consideration in the feeding of a child is the food itself. Is it good food of its kind? Is it properly prepared and served in an attractive manner? Is it the right food, containing all the elements that the child needs? Is it suitable to the child's digestion? Is the diet well balanced — not too many sweets, not too much carbohydrates? Does it contain stimulants (tea and coffee)? Is the food of the right consistency so that the teeth and the jaws of the child will have the proper amount of exercise? Is the child getting the right amount of food so that weight and growth will be normal?

Children require a greater number of Calories in proportion to their weight during their growing years (from the age of one to fifteen) than they do later, a fact which is sometimes overlooked by those in charge of their feeding. During adolescence the total daily energy requirements exceed by about 1000 Calories the requirements of a man or a woman of moderate activity. The boy of twelve to fifteen years of age is always hungry because he needs food.

One point to be kept in mind, and a most important one, is that during the early years of life the child is forming habits of eating. A failure to direct him carefully during this time may allow the formation of distastes that will affect him throughout his whole life. Familiar to all of us are the men and the women who pick and choose their food, cannot eat this or that, and who in some cases limit the variety of their food to a degree that affects their health and the happiness of those around them.

In any case of malnutrition in a child it should always be determined whether the child is eating all of the different foods supplied him, or whether he is restricting his diet by eating only part of them. It is not what is placed on the table but what is eaten that supplies the body's need, and in some way the child must be led to take foods of all the different types.

Diet and teeth. Mention has already been made of the effect of food upon the teeth, but the subject is so important that it cannot be overemphasized. E. V. McCollum writes: "The alarming increase in the incidence of malnutrition among children, the faulty condition of the teeth, the train of ills from which adults suffer which can be traced to faulty development and bad teeth, are due in a great measure to the poor quality of the diet of expectant and nursing mothers and the diet of children."

Perhaps not all the factors that enter into sound tooth building are understood, but we do know that adequate supplies of calcium and phosphorus and of vitamins A, C, and D are neces-

sary. Not only must they be furnished the child in abundance, but the mother also before the birth of the child and while she is nursing it must be supplied with them. The nursing mother needs milk to supply lime and phosphorus; sunshine, cod-liver oil, or yolk of egg to furnish vitamin D; and fresh fruits and vegetables to give an abundance of vitamin C. A baby must not be left too long without fruit and vegetable juices. Vitamin A is also necessary for tooth building. Without it the "buds" from which the teeth develop are defective and the enamel and dentine are not properly formed.

One point to be noted is that the mineral material can be extracted from the teeth and bones, and these partly softened, after they have been built. An adequate diet is necessary, therefore, not only while the teeth are being formed and coming into place, but such a diet must be continued indefinitely. Nearly all the children that formerly landed in New York in such numbers from Southern Europe had practically perfect teeth. After a few years of city life and changed diet many of them developed tooth decay. Recently it has been announced that in certain groups of children that were put on a diet especially rich in minerals and vitamins, the teeth became hard, and where decay had started it was checked. Only recently has it been discovered that vitamin C is necessary for tooth building, and it may be that the lack of this has been the cause of much of the tooth decay that has been so prevalent.

It should be understood also that physicians and dentists consider the consistency of the food important. The gums and jaws need exercise, and too soft a diet does not furnish this. When a baby begins to eat, it should have food that can be chewed.

Preparation of food. In many kitchens much of value is lost from the food before it reaches the table. Needless thick parings are removed from potatoes and other vegetables, although they contain a highly nutritive part of the vegetables; much of the mineral content and of the water-soluble vitamins

may be poured down the sink in water in which vegetables have been boiled ; bones and scraps of meat, both cooked and uncooked, are unused ; and gravy and small portions of vegetables are thrown away.

The old custom of keeping a soup pot on the back of the stove was an excellent one ; for into it were put small portions of meats, vegetables, and fruits which would otherwise have been wasted. The long, slow cooking of these materials produced most delicious soups and stews, which were far more nutritious than vegetable soups that consist merely of more or less partly cooked vegetables in unthickened, clear broth.

One of the most important steps in the preparation of food is the cooking, which is done to make the food more palatable, more digestible, or to destroy microörganisms. The principal methods of cooking are boiling, broiling, stewing, roasting, baking, and frying. Of these, frying is often the most convenient, but fried foods are more indigestible than those cooked in any other manner ; this is particularly true if the frying is not carefully and correctly done. The fat should be raised to a high temperature (350° to 400°) before the food is placed in it, for if the food is either cold or moist it tends to cool the fat and to absorb enough of it to become unwholesome. If food which is to be fried is first dipped in egg, the intense heat hardens the egg albumen and thus forms a coating which prevents absorption of fat.

It is important that cooking be done so as to preserve the vitamin and mineral value of the food. Vitamins A and C are to a considerable extent destroyed by prolonged cooking in open vessels that permit extensive exposure to oxygen, and cooking in large amounts of water may remove a large part of the minerals and of vitamins B, C, and G. Baking, roasting, and the use of "waterless cookers" help to conserve these very valuable food constituents. Heating with alkalis destroys vitamin B, and for this reason the cooking of vegetables with soda is not advised.

Serving the meals. Food should be served in an attractive way. If the food appeals to the sight and smell, it starts not only the flow of saliva ("makes the mouth water") but the gastric juices as well. Thus appetizing food served in a pleasing way helps digestion. Intense emotion, such as anger, lessens the secretions and movements of the digestive organs and interferes with digestion. Some parents forget this fact or they would not use the meal hour as a time for faultfinding and criticism. Although children must be taught to behave correctly at the table, constant nagging is not the best way to teach them.

Meals form a large part of the home life, and the family meals should be the happiest time of the day; but in some families the children are often made so unhappy by criticisms, that they even leave the table crying. They cannot possibly get in this atmosphere the full value of their food, even if it be well prepared and the diet scientifically balanced.

Children are taught dissatisfaction with food and their surroundings by example more often than in any other way. Cheerful conversation joined in by both parents and children should be the rule for everyday life, while all should eat what has been served to them without faultfinding and criticism. To do this is the height of good manners which children should be taught. The correct use of knives, forks, and spoons they learn as they get older as much by observation as by constant instruction; and most children, if those around them are well bred, learn almost unconsciously to be the same.

Variety and regularity in meals. In order that there may be no dissatisfaction with the food, variety must be provided and regularity in serving the meals observed. The method of cooking should be varied; meat should be broiled or baked one day, stewed or fricasseed another. Vegetables should be prepared differently day by day. In this day of electric refrigeration, left-over foods can be kept with such safety that it is well not to serve a meat or vegetable too often on succeeding

days. Many housekeepers make the mistake of serving so frequently some dish which has met with approval that some of the family become tired of it. Then there is a possibility that the dish will fall into such disfavor that it has to be abandoned for good. A wise housekeeper holds in reserve some dishes which are particularly enjoyed and serves them for treats when appetites are failing or days are gloomy.

The meals should be regular and served at the hour set, and the child should be required to come to his meals on time. When the regular hour for eating comes the appetite is stimulated, the digestion ready for the food. Often a good appetite is spoiled by delay in the serving of the meal and the dissatisfaction which the delay excites.

Feeding the child without appetite. Lack of normal appetite, or *anorexia*, is more common than many realize. It is one of the most difficult problems which parents and doctors have to contend with in the growing child. It may be only a temporary though rather prolonged condition which follows illness, or it may be a constant characteristic in infancy. When it is thus constant, it seems to be a fixed attribute of the individual.

As a rule the children who show this characteristic early are not of a rugged type, but on the contrary are thin, fragile, underweight, and generally below par. They become easily fatigued and have a general lack of muscle tone, the muscles of the gastro-intestinal tract, like the general muscular system, being affected. They are inclined to acidosis and frequent attacks of vomiting. This type of child is often mentally bright, but is nervous, willful, and hard to control.

Cases which appear later than infancy usually may be traced to some cause. In these cases the anorexia is often easily overcome by removing the cause, particularly if it has not been of long duration. The loss of appetite may follow an illness or is sometimes caused by a focus of infection such as infected tonsils or adenoids. Constipation is another contributing cause.

Other factors which may enter in are an unbalanced diet, with a lack of food containing vitamin B (the vitamin which increases appetite); irregularity in meals; too frequent feeding, with eating between meals; and eating an excess of sweets.

Many doctors do not approve of much milk for children of this type, since milk destroys the appetite for other foods, contains little residue and is therefore constipating, and fails to supply iron and other substances that the body requires. These physicians feel that it is better to encourage the eating of a variety of foods rather than the taking of any single food in large amounts. Some physicians report that the preparations containing vitamin B that are now sold in drug stores are quite effective, in some cases at least, in increasing the appetite.

Too little exercise in the fresh air is also a contributing factor in cases of anorexia, and the possibility of over-stimulation and fatigue should be considered. It is an excellent plan to encourage a child to rest for a short period before mealtime, particularly if he has been exercising violently, listening to exciting stories, or engaging in exciting games. This rest need not consist of lying down, but of sitting quietly and talking. At this time all faultfinding and criticism should be avoided, nor should the child be criticized during the meal.

Sensitization to some food which the child is being forced to take is yet another possibility (see Chapter 15). There is always a chance that when a person (child or adult) persistently refuses a food, it may be because he is sensitized to that food, and it may be exactly what he should not eat. It is right to encourage a child to eat what is put before him, but modern medicine teaches that not all foods are healthful for all persons. This question of sensitization may often (but not always) be settled by skin tests (page 143). If anorexia persists after all foods causing a skin reaction have been eliminated, then it may be advisable to go back to a full diet and try out foods one by one by temporarily eliminating them from the diet.

The above possible causes of anorexia must be considered in

dealing with a child who lacks appetite, but undoubtedly in most cases the emotional and environmental influences also play a large part. Most children like attention and are secretly pleased when they are urged to eat, and if their lack of appetite is frequently brought up they may refuse the food in order to remain the center of attraction. Frequently a child eats much better if no attention is paid to him. The subject of his food should never be discussed with others before him, and he should not be asked before the meal what he should like to eat. If he expresses a desire for some particular food it should be prepared, but no comment should be made if it is not eaten. A well-balanced meal should be prepared, the child should be served and required to remain at the table, and his plate should be removed with the other plates whether the food has been finished or not.

Many times parents do not realize that there is a variation in the amount of food required by different individuals. Perhaps accustomed to seeing one child eat heavily and heartily, they become disturbed because a second child eats more sparingly, begin urging him to eat more, and so create a difficulty where none existed before.

Starving a child into eating is one method which has been sometimes tried with success. If the food is served without comment, the chances are that the child will begin to realize that he no longer occupies the center of the stage; and if he is not allowed to have food between meals, and realizes that his only chance of satisfying his hunger is at the table, he will eventually learn to take the food when it is offered to him.

If lack of appetite and the habit of not eating have existed for a long time, a change of environment may be necessary. Few children feel that they can cry and refuse food if they are at the table of strangers, particularly if they are served exactly as the others are served and left to eat or not as they choose. School lunches serve a useful purpose in training children to eat what is set before them without objection or comment.

The following table taken from *Nutrition and Growth in Children*,¹ by W. R. P. Emerson, may be used for a guide in feeding and in watching the normal growth of a child.

AVERAGE WEEKLY INCREASE IN WEIGHT IN OUNCES

AGE	BOYS	GIRLS
Birth-1	4.12	4.11
1-2	1.94	1.85
2-3	1.60	1.54
3-4	1.32	1.17
4-5	1.32	1.11
5-6	1.23	1.11
6-7	1.32	1.32
7-8	1.54	1.47
8-9	1.57	1.51
9-10	1.79	1.69
10-11	1.63	2.03
11-12	1.91	2.03
12-13	2.43	2.08
13-14	3.20	2.92
14-15	3.75	2.59
15-16	4.18	2.72

Underweight children. If a child is persistently underweight he should have a thorough going over by a physician, for there may be several causes for this condition. There may be some glandular disorder, incipient tuberculosis may be present, there may be some focus of infection or some chronic intestinal disorder, or the thinness may be caused by faulty diet. A point which should always be considered is the natural build of the child. He may be of a long, lean type, with a narrow face, long neck, high shoulders, long, tapering hands and feet, and long, narrow trunk. A person of this type as a rule is low in weight in proportion to his height. After a physical examination, if no defects are found, it then becomes a question

¹ D. Appleton-Century Company, publishers. Table used by permission.

of feeding to build up the weight. These below-weight children are sometimes (not always) the type that develops anorexia.

Overweight children. Overweight is a condition that should be attended to as carefully as underweight. Slight overweight is never dangerous in either children or adults. Indeed, the slightly overweight are apt to be more healthy and more even-tempered than the underweight. But an excessive amount of flesh at any age should be corrected if possible. The excessively large child has probably some glandular imbalance that should be corrected. Such children should therefore be given as careful a physical examination as the underweight children, and if no physical disorder is found the food should be regulated by cutting out the too free use of fats, starches, and sweets, and the child guarded from overeating and from eating between meals.

QUESTIONS

1. What has been done in the last few years to improve the feeding of infants?
2. Give several reasons why children of pre-school age are frequently not fed as carefully as infants are fed.
3. How can it be determined that a child has malnutrition?
4. What is the principal cause of malnutrition?
5. During which period of life does a person need most food?
6. What vitamins are especially necessary during the period of teething?
7. In what foods are these found?
8. Why is it necessary to consider the effect of food upon the teeth in later years?
9. Mention some points that are important in the cooking of food.
10. What effect upon appetite and digestion does the method of serving the food have?
11. Why should meals be regular?
12. What is anorexia?
13. Mention some of the causes of anorexia.
14. How can this condition be corrected?
15. Why should the overweight child be examined by a physician?

CHAPTER FOURTEEN

THE FOOD OF THE ADULT

It is impossible for us in this text to include a complete treatise on diet. All that we can do is to set forth the principles of nutrition, as we have done in Chapter 12, and then discuss in the light of these principles a few of the problems of diet that most frequently arise. In this chapter we shall take up quite briefly some of the difficulties commonly encountered in the feeding of adults and indicate the lines along which the solution of the problems may be found. For detailed tables of food analyses, methods of computing Calorie and protein intake, and other details of practical dietetics, special books on nutrition must be consulted.

The inadequate diet. In laboratories investigators make up diets that contain all the food elements that a rat needs. They place the animals on these diets and find that they live and grow quite well. The diet supports life and permits what has been accepted as satisfactory growth.

Recently, however, it has been discovered that there is improvement in the animals if the supply of some of the minerals and vitamins is increased. The animals grow faster. They are more vigorous. They live longer. A supposedly satisfactory diet has been proved not to be the best possible diet. The body lives better with an abundant supply of each of the needed materials than with ordinary amounts of some of them.

Physicians believe that there are many adults living in a state of low health because of an insufficient supply of some of the necessary nutrients. These persons may be taking enough protein and calories to keep them going and have enough vitamins to prevent their coming down with frank cases of beriberi, scurvy, or pellagra; but they lack the health and vigor and general well-being they would have if the diet supplied a rich assortment of all the needed food elements. There are persons who think that because of their delicate health they

cannot eat certain foods, when the real situation is that they have delicate health because of a lack of the substances that these foods would supply. The fundamental cause of their ill health is that the diet does not supply abundantly the energy and all the different materials needed for vigorous life.

A restricted diet, unless taken under the advice of a physician or an expert in nutrition, is always dangerous. All different kinds and classes of foods should be eaten, because this is the safest way of getting all the different substances that the body needs. Especially should milk and an abundance of vegetables be included in the diet. These are the "protective foods" — the ones that provide the greatest variety of minerals and vitamins.

The body weight. If we eat more food than the body burns, we gain in weight. If we eat less than the body burns, we lose weight. The body keeps count of intake and outgo with mathematical precision, and shows us the balance when we step on the scales. We can be underweight, either because of taking too little food or because the body fires are running too high and consuming the food too rapidly. We can be overweight, either because too much food is eaten or because the vital flame is low and the food is burned slowly. It is the proper balance between intake and oxidation of food that keeps the weight at the right point.

When it is desired to change the body weight, a physician should be asked to decide whether the case is a simple one that requires only regulation of the amount of food taken, or whether some diseased condition is involved. Underweight and overweight are not always caused by under- or over-eating, as is popularly supposed, and for this reason, if for no other, dieting should be undertaken only under the direction of a physician. If the physician suspects an abnormal condition, he will include in the examination a basal metabolism test (page 167). Children are frequently underweight, but adults are much more likely to be overweight.

Causes of overweight. The factors to be considered in looking for the reason for obesity are :

1. *Overeating.* This is by far the most common cause of overweight. More food is taken into the body than it can burn, and the surplus remains in the body and increases its weight. The free use of alcohol tends to increase weight, as it yields energy and in proportion to the calories in it prevents the oxidation of food.

2. *Lack of exercise.* The muscles are the greatest users of food. The one quick natural way we have of speeding up food oxidation is by increased exercise of the muscles. Food that would be burned if exercise were taken will accumulate as fat if there is a lack of exercise.

3. *Imbalance of the endocrine secretions.* In cases of hypothyroidism there is slow oxidation in the body (as is shown by the basal metabolism test), with a tendency to gain in weight (page 168). It is reported also that in cases of deficiency of the hormone from the cortex of the suprarenal glands there is slow metabolism, and that a lack of secretion from the posterior lobe of the pituitary gland causes a deposit of fat on the lower part of the abdomen and upper part of the thighs — “girdle fat,” or fat below the waist and above the knees. The influence of the gonads is seen in girls at adolescence and in the increase in flesh in women after the menopause.

4. *Constitutional obesity.* Some persons inherit a tendency to obesity and even on a limited diet have trouble in keeping down their weight. Doubtless this is in part due to the endocrine composition of the person. It is in part due to temperament, perhaps, for nervous, high-strung persons hold their muscles at a higher tension and oxidize more food in them than do calm, placid persons who sit relaxed and at ease. In many cases of obesity the basal metabolism seems to be normal, but the body apparently comes to an equilibrium in its intake and outgo at a higher weight. In the early stages of diabetes, in which disease the normal power of burning sugar is lost, there

is often an increase in weight. Some investigators have recently come to the belief that certain "naturally fat" persons do not have the usual power of burning fat, just as diabetics do not have the usual power of burning sugar. They believe that these persons should not eat much fat and should not allow themselves to become fat; for in such a case the body rids itself of fat only with unusual difficulty.

Adverse effects of obesity. An obese condition causes inconvenience and loss of good looks, but there are other reasons why obesity should be corrected if possible. Its most serious results are difficulty in walking, shortness of breath, embarrassed heart action, and fatigued heart muscles. When these symptoms develop, the treatment frequently consists of rest in bed and treatment for reducing the amount of flesh. Obesity is also a danger in infectious diseases, especially in pneumonia, and it plays an important part in hypertension.

Principles of a reducing diet. If an examination of an overweight person shows glandular deficiency or other abnormal condition, the oversight of a physician is demanded and his advice should be followed. If no complications are present, the weight can often be reduced, without serious discomfort or injury to the health, by attention to the diet. In planning a diet for reduction, one simple fact is to be kept in mind. The excess weight of the body is caused solely by an accumulation of fat, and a reducing diet should cut down the amounts of the fuel foods only. A fat person has in his body no surplus of protein, minerals, or vitamins, and a reducing diet should contain these in the usual amounts. During the reducing process these should be supplied to the body, while for fuel it is compelled to burn, in part at least, its own fat.

Fats are the highest of all foods in energy and the ones that add most to the body's weight. They are, therefore, held to a low point in a reducing diet. Vegetable oils and pork fat furnish no vitamins, and they should be omitted entirely. Any fat that is taken should be high in vitamins. Butter, egg yolk,

and the fat in milk are of this kind. The carbohydrates that are taken should be secured from vegetables and fruits that will furnish vitamins and minerals also. Sugar and starch carry no vitamins or minerals and should be cut to low amounts or omitted. Spaghetti, macaroni, white bread, syrup, cake, and other foods that are high in energy but low in vitamins and minerals are the wrong foods for one who is inclined to be overweight. We must keep down the energy intake (Calories) and keep up the supply of the materials for the building and life processes.

The common mistake made in attempting to lose weight is to cut down not only the body's fuel supply but also the proteins and other substances that are necessary for its life. Without these substances there is a feeling of weakness and hunger. Often the face looks drawn. The reducing process is a failure, and the patient goes back to the old eating habits because the diet proves inadequate to support health. The mistake was made of reducing not only the intake of fuel foods but of the building foods, vitamins, and minerals also. In any diet a full supply of these is necessary.

A simple reducing diet. The following is given as an example of a diet that reduces the Calorie intake and yet maintains the supply of necessary material constituents:¹

Breakfast:

Juice of one orange added to whipped white of one egg.
Fish or meat, 2 ounces.
Bread, $\frac{1}{2}$ thin slice ($\frac{1}{2}$ ounce).
Coffee with no cream or sugar.

Lunch or dinner:

Low-Calorie vegetables, 4 medium-sized helpings.
Meat, cooked, lean, 3 ounces ($4 \times 3 \times \frac{1}{2}$ inch).
Grapefruit, $\frac{1}{2}$.
Bread, $\frac{1}{2}$ thin slice ($\frac{1}{2}$ ounce).

¹ The diet here given is that used by Dr. F. A. Evans of Pittsburgh with some of his patients.

Supper:

Low-Calorie vegetables, 4 medium-sized helpings.

Milk, 1 glassful.

Cottage cheese, 2 ounces (2 heaping tablespoonfuls).

Bread, 1 thin slice (1 ounce).

LIST OF LOW-CALORIE VEGETABLES

(May be used fresh or canned)

Artichokes	Dandelion	Radishes
Asparagus	Egg plant	Rhubarb
Beet greens	Endive	Sauerkraut
Broccoli	Kale	Sorrel
Brussels sprouts	Leeks	Spinach
Cabbage	Lettuce	String beans
Cauliflower	Marrow	(very young)
Celery	Mushrooms	Tomatoes
Collards	Okra	Turnip greens
Cucumbers	Pumpkins	Water cress

Other rather low-Calorie vegetables, but not so low as the above, are: beets, carrots, green peas (very young), kohl-rabi, onions, parsnips, string beans, squash, and turnips. One helping of one of these is about equal in Calories to two helpings of the first group.

Fruits (except grapefruit) are higher in Calories than the lowest group of vegetables. Blackberries, lemons, muskmelons, oranges, peaches, pineapples, raspberries, strawberries, and watermelons are on an average about equal in carbohydrates to the vegetables of the second group. Apples, bananas, and pears among fruits, and corn and potatoes among vegetables, are in a third richer group.

The above diet provides about 1200 Calories. An average-sized woman when moderately active produces about 2000 Calories of heat; so there is left about 800 Calories to be secured each day by the oxidation of body fat. The oxidation of one ounce of fat yields about 260 Calories; so on this diet the weight should be reduced almost 3 ounces each day.

Sometimes, because of the retention of water, the weight may not drop at all for some days ; but, if the energy intake is cut below the outgo, the body will burn its own fat and become lighter. Gain or loss must be counted by weeks or fortnights and not always by single days. After the desired weight is reached, the amount of food taken can be increased until income and outgo balance — until there is neither gain nor loss of weight.

Usually it is best not to try to reduce too rapidly ; two to three pounds a week are enough to lose (one pound if this rate of loss can be maintained). Some persons seem to do best by getting into the diet gradually. For example, the first week they cut out all non-vitamin-bearing fats. The second week, in addition, they reduce the amounts of starches and sugars. The third week they substitute fruit for other dessert. The important points are to keep up the metabolism by taking plenty of protein ; not to reduce the bulk of the food ; not to reduce the vitamin and mineral intake ; and to lower the energy intake. This is accomplished chiefly by including meat in the diet and eating liberally of low-Calorie vegetables and fruits. All the essential food constituents are included, but the Calories are reduced so that body fat will be burned. Exercise should of course be taken to increase oxidation.

If there is hunger between meals, a drink of water or a cup of tea or clear bouillon may help appease it. Apples are particularly good for relieving hunger, and bulky foods like raw cabbage may be helpful. Plenty of liquid may be taken. It has been shown that going without water does not increase the amount of food oxidized.

Foolish and quack methods in the treatment of obesity. Overweight may be due to any of several causes, but most obese persons, instead of taking the sensible course of first having a physical examination to determine the reason for their condition, rush into the use of any method of reduction which they have read of in advertisements, have been told of by a

chance acquaintance, or that they themselves can devise. Most of these methods involve physiological absurdities such as going without meals, restricting the diet to a few foods that fail to supply the absolutely necessary minerals and vitamins, or starving beyond common sense. Possibly in no other way do people injure their health as they do in their efforts to reduce.

In no fields have the sellers of quack medicines and quack methods reaped a greater harvest. Reducing medicines either for internal use or bathing are offered ; salves to be rubbed on the parts of the body needing to be reduced and which are supposed to melt away magically the fat under them, are on the market ; suction cups may be had for use over the fatter parts ; and rolling pins which could be bought from a ten-cent store are sold at fancy prices for rolling off the surplus flesh. Every other device that the wits of quacks can devise and that the credulous will buy is offered for the relief of obesity. The only sensible procedure is to pass them all by and seek the advice of a physician who understands the body and how it works.

Acidosis. A definite acid-alkaline balance in the blood is essential to life, and any marked degree of change in this balance causes serious difficulty. Acidosis is a condition in which there is a decrease in the alkalinity of the blood. An actual acid condition is not present, for the blood always remains alkaline ; but in acidosis the balancing point is slightly too far to the acid side.

Acidosis may occur in many diseases. In some it is of little significance, in others of real gravity. It is present in starvation, to a slight degree after an anæsthetic, during pregnancy, in infectious diseases, in diabetes, and in some diseased conditions of the kidneys.

There are two kinds and two causes of acidosis. One kind is due to eating too many foods that leave an acid " ash " in the blood. Elements like sulphur, phosphorus, and chlorine are acid formers ; and elements like sodium, potassium, calcium, and

magnesium are alkali formers. If these two groups of elements are taken in equal proportions they neutralize each other, but if one or the other is taken in excess in the diet we have an acidosis or an alkalosis. Meat, wheat, and eggs leave an acid residue, and the diet is almost always too acid rather than too alkaline.

In order to keep the proper acid-alkali balance in the mineral food residue, milk and fruits and vegetables, such as oranges, grapefruit, apples, lemons, cabbage, celery, carrots, potatoes, peas, and beans should be used to balance the acid-forming meat and bread. Many of the fruits contain acids, but these are carbon acids which are burned to carbon dioxid and water and do not affect the mineral ash. The acids in oranges and lemons, therefore, do not change the acid-alkali balance of the blood, while other elements in these fruits shift the balance to the alkali side. Beans are of all common foods the most alkaline.

The other kind of acidosis is from acids formed from incomplete oxidation of fats. When a molecule of fat is burned in the body, a molecule of sugar burns with it, and without the sugar "the fats burn with a smoky flame," leaving fatty acids in the residue. In diabetes (in which condition the body cannot use sugar), the acids from the fats may accumulate until there is unconsciousness or even death.

There are persons who get headache from this kind of acidosis when they miss a meal. The sugar in the blood runs low and the fats are in consequence incompletely burned, thus causing an accumulation of fatty acids in the system. Some persons who try to reduce by fasting or by living on a diet that contains no sugar or starch, find themselves in a serious condition because there is not enough sugar in the blood to allow the fats to be burned beyond the acid stage. Not infrequently children who are subject to periodical attacks of vomiting, diarrhea, and other intestinal disorders are suffering from acidosis. In cases of this kind an addition of sugar and starch and a lessening of the fat in the diet is indicated.

Acid stomach indicates an unbalanced diet. In many cases the starch and sugar should be reduced, fried foods avoided, and such gas-producing foods as cabbage, turnips, onions, and spices omitted from the diet.

Avoidance of food fads. Nutrition is by far the most important factor in hygiene, but it is also the most complicated, and few persons understand it even in a general way. In consequence there are many strange ideas about foods started by food faddists without scientific knowledge. Other food beliefs, although scientifically incorrect, are put forth with a simulation of science by quacks and propagandists who hope to profit financially from the ideas they are advancing. There are so many excellent books written today by medical men of unquestioned standing and integrity and by scientific men who are graduates of good universities and connected with laboratories of research, that it seems strange that so many persons demanding the best in every other part of life are still satisfied to obtain their information on such subjects as food and medicine from any source that is not known absolutely to be both disinterested and scientifically informed.

QUESTIONS

1. What danger is there in a restricted diet?
2. How can the weight of the body be increased or decreased?
3. What should be done before an attempt is made to change the body weight?
4. Give four causes of obesity.
5. What are some of the adverse effects of obesity?
6. In a reducing diet, which foods should be decreased in supply and which ones kept up in full amounts? Why?
7. What common mistake is made in trying to reduce the weight?
8. How can a supply of vitamins and minerals be secured without too great an energy intake?
9. What is acidosis? Distinguish between the two kinds.
10. What is the cause of fatty-acid acidosis, and how may the condition be remedied?

CHAPTER FIFTEEN

PROTEIN SENSITIZATION OR ALLERGY

INHALING the pollen of weeds and grasses causes hay fever in certain persons. Inhaling dandruff and hair from horses or dogs, or perhaps the dust from feather pillows, will throw other persons into an attack of asthma. Eating strawberries, fish, tomatoes, or even bread may cause an attack of hives or eczema.

It is a strange fact that practically any protein food may cause in certain persons uncomfortable symptoms, headache, nervous twitching, skin disorders, or other troubles; and that colds, bronchitis, conjunctivitis, hay fever, or asthma may follow the inhalation of a substance that to most persons is harmless. "What is one man's meat is another man's poison" may be literally true.

Sensitivity or allergy. A person who is injuriously affected by a substance that is harmless to most persons is said to be *sensitive*, or *sensitized*, to that substance. Sometimes he is said to be *hypersusceptible* to it. The word *allergy* is usually employed in medical writings to denote hypersusceptibility, and one who is hypersusceptible is said to be in an *allergic condition*.

In the past the cause of the discomfort and ill health experienced by allergic persons was shrouded in mystery. Even yet we have no idea as to why they are hypersusceptible. Fortunately, however, a simple method by which it is often possible to tell whether a food or some substance which is being inhaled is causing the trouble has been discovered, and a method of removing the sensitivity that in many cases is wholly or partly effective has been worked out. With a few exceptions, the substances to which persons are hypersensitive are proteins.

Skin test for sensitivity. The test for sensitivity is usually made in the following manner :

On the front of the arm, scratches about an eighth of an inch long are made. These are just through the epidermis and are not deep enough to bleed. One of these scratches is used as a "control" and on it nothing is placed. Each of the others is used for testing some suspected substance.

The test is made by applying to the scratch a small quantity of the suspected protein in a powdered condition. To dissolve the protein and hasten its absorption, a few drops of an alkaline solution are placed on each scratch. This is left for thirty minutes and then washed off.

A positive reaction is indicated by a white elevation which looks like a wheal, or hive, and is about a quarter of an inch in diameter. A smaller place than this is considered doubtful, but it is often thought best to retest the proteins showing this doubtful reaction. Usually a positive reaction shows in from five to thirty minutes, although sometimes it does not appear until many hours later.

In a suspected case of sensitivity, tests should be made with the proteins of all foods which are eaten frequently, with the hair and dandruff of household animals, with furs which may be worn, with feathers with which the person may come in

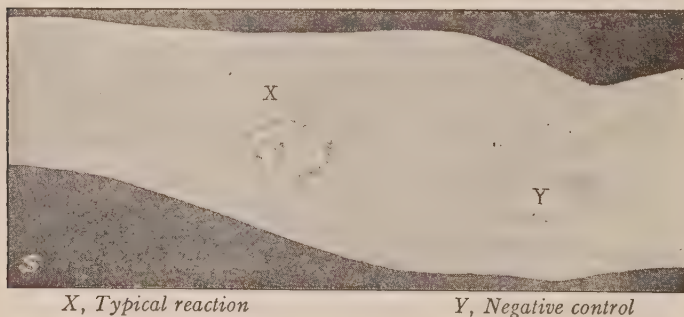


FIG. 45. The result of a skin test with horse-hair protein on an asthma patient. At the place marked X a scratch on the skin was made and the protein rubbed in; at the place marked Y the skin was also slightly scratched, as for the other test, but no protein was rubbed in.

contact, with orris-root powder if this is used, and with pollen protein from plants of all kinds that might be causing the trouble. Bacterial proteins are also sometimes tested for.

It must be understood, however, that there are many cases of allergy, especially in older persons, that cannot be diagnosed by the skin test. Sometimes in these cases the offending substance can be found by carefully excluding from the diet for a time any food that may be suspected. A sensitized nursing infant may be made ill by something eaten by the mother, even though the mother herself may not be affected by it.

Treatment for sensitivity. The first and most simple method of dealing with protein sensitization is to avoid the protein that is causing the trouble. This is done by getting rid of, or keeping away from, the dog, horse, pillow, fur coat, or other source of the offending protein, or by stopping the eating of foods to which one is sensitive. If this method is consistently carried out for a fairly long period of time, the sensitivity is sometimes (but not always) lost.

Another treatment used with success in many cases is the subcutaneous injection of solutions of the offending proteins. The physician begins the treatment with a weak solution and gradually increases the strength until the patient becomes desensitized. It is supposed that the same principle underlies desensitization by this method that is operative when active immunity is produced by the introduction of bacteria and bacterial toxins into the body (page 189).

A third method is to administer pills or solutions containing minute amounts of the protein by mouth, and gradually to increase the dose until a large amount can be taken. This method is really vaccination by mouth, and the patient must be faithful and regular in following it or the desired results will not be secured. While the protein is being taken in these measured amounts, all foods that contain this protein must, of course, be carefully excluded from the diet.

Treatment for hay fever and asthma. For pollen sensitization (hay fever), subcutaneous injection of the pollen has been found the best. The treatments are given once a week or oftener and should begin five or six months before the season of the plant, to allow a sufficient number of treatments to be given. If one has failed to have this pre-seasonal vaccination, the inoculations can be given during the season when the pollen is flying, but with not quite so good results. Many persons are permanently relieved after two or three years of pre-seasonal treatment, others must be treated longer, and still others must have inoculations each year as long as they are exposed to the pollen.

It is estimated that of asthma cases 70 per cent are due to sensitization to some substance that is being eaten or inhaled, and most cases of asthma can be relieved by inoculations with the offending substance. Often the trouble is due to some substance that can be avoided, and the mere knowledge of what this substance is, is of great value to many asthmatics.

Our knowledge in the field of sensitivity is new, and our explanations of the facts in it are probably in large part incorrect. Some physicians are inclined to believe that allergy is far more common than has been believed and that many of our everyday ailments are due to it. They believe that in different persons different tissues become sensitive, and that the effect produced by the offending substance depends on which tissue is allergic. Thus they hold that if the skin is sensitive, the person, after eating a certain substance, may have hives or a breaking out. If his brain is sensitized, he will have a headache. If the nasal mucous membranes are sensitive, he will have symptoms of a cold. If the intestinal tract is sensitive, he may have an attack of diarrhea or abdominal pains.

How far the studies of allergy that are being made will lead us in medicine and hygiene we cannot now say, but it is true that no other recent advance in medicine has been of more benefit to certain persons than the knowledge that has been

gained of protein sensitization. Babies that were continuously ill have recovered at once when given other food instead of cow's milk. Asthma patients have been completely relieved by getting rid of dogs or feather pillows. Not only should those persons who have hives, eczema, hay fever, and asthma be tested for hypersusceptibility, but also persons who have a chronically inflamed condition of the respiratory mucous membranes, nervousness, headaches, and any condition of general ill health that is without other evident cause. Many persons who are allergic to common foods like bread, potatoes, and milk, or who are sensitive to many different foods, are never well because of the effect of their food upon them. The diagnosis and treatment of such a case is quite beyond the patient's own resources and he should go to a physician who can make the necessary tests and administer the treatment that is appropriate to his case.

In general it is believed that the processes by which allergic persons become immune to proteins that they inhale or take as food are the same as the processes by which we become immune to disease germs and their toxins. Of all treatments for allergy, therefore, good hygiene should be a part. Sunshine and an outdoor life have been especially recommended as being helpful during treatment for this condition.

QUESTIONS

1. What is meant by sensitivity, or hypersusceptibility?
2. What kind of substances cause sensitivity?
3. What uncomfortable conditions are caused by protein sensitivity?
4. Describe the method by which a person is tested for sensitivity of proteins.
5. What are the treatments given to overcome sensitivity?
6. What is the recognized cause of hay fever?
7. How may asthma be caused?
8. What is the treatment for hay fever?
9. Why is the knowledge of protein sensitivity of great value in medicine?

CHAPTER SIXTEEN

THE CIRCULATORY SYSTEM, BLOOD, AND LYMPH

FOOD and oxygen must be carried to all parts of the body, and the waste of the tissues must be removed. The blood does this work, and the importance of keeping the blood and the system by which it circulates in good condition cannot be overemphasized. Each individual, therefore, should understand what the blood is, how it does its work, how it is circulated throughout the body by the heart and the vessels, and how to keep the blood and the organs of the circulatory system in good condition.

The circulatory system. In order to supply what is needed in the body and to remove the tissue wastes, the blood must come in contact with every part. To enable it to do this the heart acts as a pump, and there runs throughout the body a wonderful system of vessels or tubes through which the blood flows. The heart and the vessels together are spoken of as the *circulatory system*.

This system is divided into two sub-systems, the *systemic* and the *pulmonary*. The systemic system carries the blood all through the body. The pulmonary system carries it through the lungs, where it gives up carbon dioxide and takes in oxygen from the air.

The left side of the heart pumps the blood through the systemic system and back to the right side of the heart. The right side pumps the blood to and through the lungs and back to the left side of the heart again. The circulation of the blood is quite rapid. It is estimated that the average blood corpuscle requires less than a half-minute to make a complete circuit through both the body and the lungs and return to its starting point.

The heart. The heart lies in the thorax, between the two lungs. Its base is back of the breastbone. Its apex points obliquely downward and is a little below and to the right of

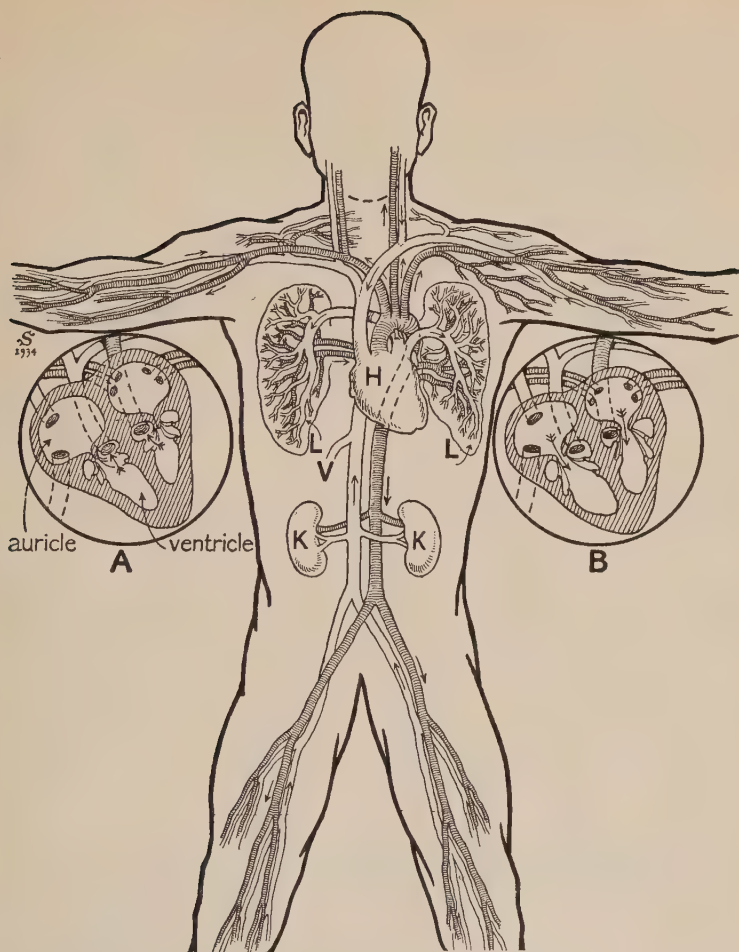


FIG. 46. Diagram of the circulatory system. *H* is the heart, *L* the lungs, and *K* the kidneys. The systemic veins and pulmonary arteries, which carry the dark or venous blood, are shown in white. The pulmonary veins and the systemic arteries, which carry the red or arterial blood, are dark. *V* is the hepatic vein, which returns the blood to the heart from the liver, stomach, intestine, and spleen.

A is a diagram of the heart when the ventricles are in contraction and the blood is being forced out into the arteries. *B* is a diagram of the heart when the ventricles are relaxed and the blood is flowing down into them. Note that when the ventricles contract, the valves above them close and keep the blood from flowing backward into the auricles.

the left nipple. It is divided into four chambers. A complete partition separates the right and the left sides, and each side is again divided into an *auricle* and a *ventricle*.

The right auricle receives the impure blood, or that which has passed through the body. The left auricle receives the re-oxygenated blood from the lungs.

From the auricles the blood passes into the ventricles, and then by the contractions of the ventricle walls it is forced on into the arteries, which carry it through the body and the lungs. Lying in the openings between the auricles and the ventricles, and also at the bases of the great arteries that lead out from the ventricles, are strong valves which prevent the blood from flowing backward.

The heart is a powerful muscle. During its contraction, which is spoken of as the *systole*, it becomes a hard ball; during its relaxation, or the *diastole*, it becomes soft and flabby. The walls of the auricles are rather thin, but the walls of the ventricles are thick and strong, the one on the left side being thicker and stronger than the one on the right.

The movements of the heart are automatic or involuntary, but its slowness or rapidity is influenced by many factors. Its speed is increased by exercise; it is quicker when the individual is standing than when sitting or lying; it usually

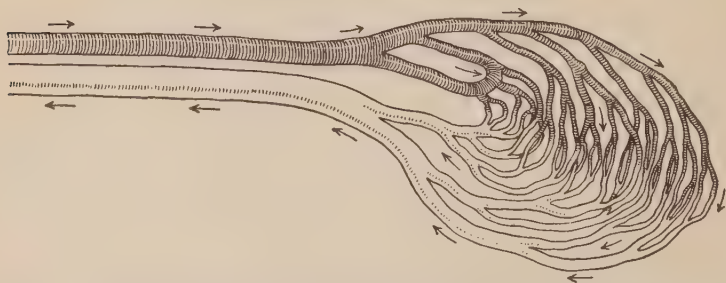


FIG. 47. Diagram showing how the blood flows out through the arteries, passes through the capillaries, and comes back to the heart through the veins.

becomes more rapid as the day progresses; it is more rapid after eating; frequently it is influenced by nervous or mental conditions; and it is quickened in fevers and most infections. In the average adult man the heart beats about 100,000 times in twenty-four hours. No other muscle in the body is so hard-worked as the heart.

Arteries, capillaries, and veins. The vessels which carry the blood from the heart are called *arteries*, and as the blood is forced into and along the arteries by the contractions of the heart, it moves through them in spurts. It is this movement which enables us to distinguish an arterial hemorrhage from a venous one; if an artery is cut, the blood escapes in spurts, but if a vein is cut, the blood runs slowly or oozes out.

Arteries are of varied sizes. The artery which leaves each side of the heart is very large, but going out from it are branches which divide and subdivide again and again. These branches become smaller and smaller until finally they form through all the tissues of the body a network of tiny blood vessels called *capillaries*. The capillaries communicate freely with each other, and are so close that the finest needle point could not be passed between them.

The veins form a system similar to that of the arteries, but in them the blood runs toward the heart, not away from it. Starting with the systemic capillaries and going toward the heart, two principal veins — one from the upper and one from the lower parts of the body — gather the blood from everywhere in the body and empty it into the right side of the heart. Then the blood goes into the pulmonary system to the lungs, and is carried by four veins back to the left side of the heart, where it starts again on its round of the systemic circuit. Attached to the walls in the smaller veins are pocket-like valves which keep the blood from flowing backward.

The walls of the blood vessels. The walls of an artery or a vein are formed of three layers or coats. The inner coat is a thin



FIG. 48. A cross-section through a small artery and vein (diagrammatic). The muscular middle layer in the wall is much thicker in the artery than in the vein.

layer of epithelial tissue which lines not only all the blood vessels but also the heart. The middle or muscular coat is controlled by the nerves, and by its contractions in the smaller arteries this coat regulates the amount of blood circulating in an organ or in any part of the body. The outer coat of connective tissue gives strength and firmness to the walls of the blood vessels.

The walls of the arteries are strong and elastic, the muscle coat in them being especially well developed. When the heart contracts and forces more blood into them, the larger arteries expand to accommodate this extra amount. In the time between the beats of the heart the stretched walls of the arteries, like a tightly filled rubber hose, keep a steady pressure on the blood, thus forcing it onward through the capillaries.

The veins carry a much more steady stream of blood than the arteries, and their walls are much less elastic than those of the arteries. The walls of the capillaries are formed of one layer only, the inner epithelial one. They are so extremely thin that materials needed by the tissues of the body go outward through them and the wastes from the tissues pass into the capillaries. In the lungs the capillaries are in the walls of the air sacs, and here the blood receives oxygen from the air and gives off carbon dioxide.

Blood pressure. The degree of pressure of the blood on the walls of the vessels is dependent on the force and rate of

the heart beat, the elasticity of the walls of the arteries, the resistance in the small arteries and the capillaries, and the volume and consistency of the blood.

Blood pressure may be increased by excessive eating and drinking, by the use of alcohol and tobacco, by an excessive amount of tea and coffee or of certain drugs, by a disturbed mental state, and by an upset endocrine balance (page 166). Obesity increases blood pressure by making it harder for the blood to flow through the fat-laden tissues.

The higher the blood pressure the harder the heart must pump, and the heart condition is materially affected by the degree of blood pressure. Although high blood pressure is more common in the old than in the young, it is sometimes present in young persons.

Low blood pressure is due to weak action of the heart or to a relaxed condition of the vessel walls. Usually low blood pressure goes with a run-down physical condition.

The blood. The blood consists of a liquid part, the *plasma*, and of *corpuscles* floating in the plasma. Of the corpuscles there are two kinds, the red and the white. In the average healthy man there are about five million red corpuscles and eight thousand white ones in a cubic millimeter of blood — an amount that would form a small drop the size of a pin head. The total amount of blood in the body is estimated to be from 5 to $7\frac{1}{2}$ per cent of the body weight — somewhat more than a gallon of blood in a 160-pound man.

When blood clots, fine white threads composed of a material called *fibrin* form in the plasma and enmesh the corpuscles. The yellow liquid remaining is called *blood serum*.

The red corpuscles. The red corpuscles give the color to the blood. The coloring matter in them is an iron-containing protein called *hemoglobin*, and it is the hemoglobin that carries oxygen. When the blood enters the lungs it is dark in color, but when the hemoglobin unites with oxygen it becomes bright

red. The color, therefore, is an indication of the amount of oxygen which the blood contains.

The red color of the blood shows very plainly in such exposed regions as the lips and the nails. A pink color in these shows that the blood is circulating normally and contains sufficient oxygen; a blue appearance indicates a sluggishness of the circulation and a scarcity of oxygen.

The carbon dioxide is carried in the blood, not in chemical combination, but in solution. It is in part dissolved in the plasma and in part in the corpuscles, and its presence does not change the color of the blood. Most of the red corpuscles are formed in the red marrow of the bones, and they are broken up chiefly in the spleen, thus being destroyed and renewed constantly. Part of the pigment from the destroyed corpuscles leaves the body in the bile.

An interesting fact connected with the formation of the red corpuscles illustrates how wonderfully the body is prepared for emergencies. The red marrow in which these corpuscles are formed is found only in certain bones or parts of bones, such as the flat and short bones of the head and the heads of the long bones. However, if there is need of active regeneration of the red cells (as after a severe hemorrhage), yellow marrow will assume the characteristics of the red, changing in color and doing its share of the work of replacing the number of needed red cells. After severe hemorrhage and in anemic and weakened conditions, a patient is sometimes given an additional supply of red corpuscles by transfusion of blood from another person.

Blood groups. Human beings are divided into four groups on the basis of differences in their red corpuscles. In just what the differences in the corpuscles consist is not known. But if blood from a person belonging to one group is transferred to the vessels of a person of another group, the transferred corpuscles break up and may cause serious trouble. It is necessary, therefore, before transfusion is done to determine

the blood group of the patient and to choose a donor (giver of the blood) of the same group. These blood groupings are inherited according to laws that are now known, and in some cases they can be used to check claims of relationship.

The white corpuscles. White corpuscles are pale in color and are soft and sticky. Some are smaller and some are larger than the red corpuscles. They have the unusual power of movement and of changing their shapes, and often escape from the capillaries by passing through their walls.

The white corpuscles are classified according to their size and shape, the two principal groups being the *lymphocytes* and the *leucocytes*. The lymphocytes are not granular and have very little ameboid motion (power of moving themselves); the leucocytes, on the contrary, are granular and have a very characteristic ameboid or creeping motion. They are often called the policemen of the body, because they promptly invade any injured or diseased tissue and absorb and digest matter that is foreign or hurtful to the body. They form an important part of the body defense against germs (page 189).

The lymph. The blood plasma passes out through the capillary walls and fills all the spaces in the tissues. This escaping plasma is called *lymph*. Every cell in the body is surrounded by lymph, and the amount of lymph is much greater than the amount of blood. It is the lymph, and not the blood within the blood vessels, that comes in direct contact with the tissues of the body and supplies their needs. Fresh lymph is constantly escaping through the capillary walls, and the old lymph is drained away and poured back into the blood.

The lymphatic vessels. From the minute spaces between the body cells the lymph is gathered into the lymph capillaries. These unite to form larger vessels which finally all empty into the blood (Fig. 158). The lymph is impelled onward in the vessels by the pressure of the fresh lymph escaping from the blood capillaries, by the alternate expansion and contraction

of the chest in breathing, and by the pressure and massaging of the vessels in muscular movement. All along the course of

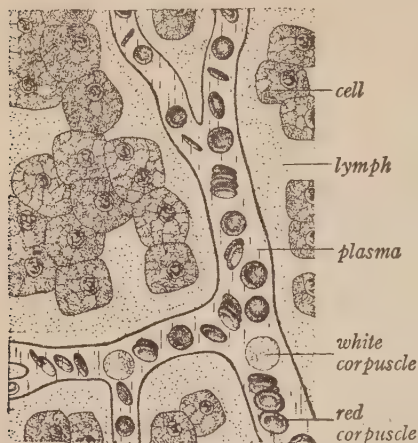


FIG. 49. The cells are bathed in lymph, which is plasma that escapes through the thin walls of the small blood vessels. (Diagrammatic.)

the lymphatic vessels are valves which prevent the backward flow of the lymph. These give to the lymphatic vessels a knotted appearance.

The lymph nodes. At intervals along the lymphatic vessels are solid, whitish, granular bodies which are called *lymph nodes*. There are many hundreds of these nodes in the body, and they vary in size from that of a pinhead to that of an almond. They have a connective-tissue sheath

or covering and are filled with lymphocytes. Popularly the lymph nodes are known as "lymphatic glands."

One function of the lymph nodes is to act as filters. When the lymph moves through infected tissues, it takes up the germs. These it carries to the nearest node, where the germs are filtered out, unless the number is too great or the germs are too virulent for the node to destroy. Thus the infection is not allowed to reach the blood stream. If the germs are too virulent or there are more of them than can be destroyed at the first node, the node becomes sore and the infection is carried by the lymph along to the second node. For example, if there is infection in the tonsils or in the teeth, those lymph nodes which lie just under the jaw become tender to the touch and may even at times become open sores. In early tuberculosis the nodes of the neck and about the lower part of the trachea are often enlarged.

A sore or swollen lymph node is an indication of infection, and the source of that infection should be found and removed before other parts of the body are affected.

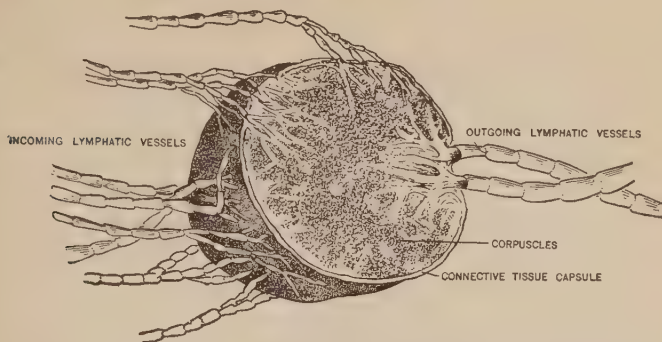


FIG. 50. A lymph node. The lymph filters through among the white corpuscles in the node.

A second function of the lymph nodes is to act as a breeding place for the lymphocytes. These divide and multiply within the nodes and from there are carried by the lymph into the blood stream. Some investigators believe that the leucocytes are formed by the growth of the lymphocytes. A more generally accepted idea is that the leucocytes have an independent origin in the bones and that the lymphocytes always remain lymphocytes.

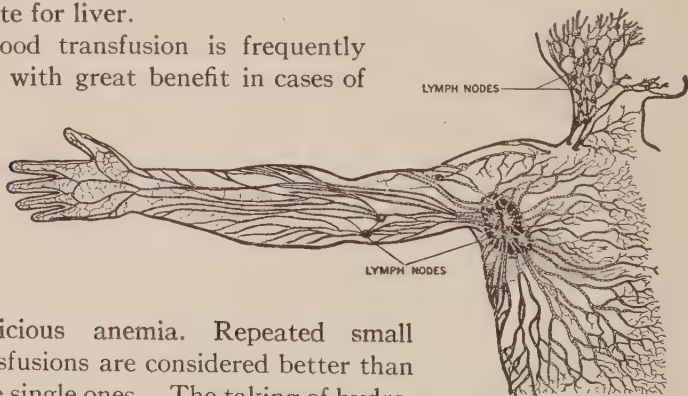
Diseases of the blood. The two most common diseases of the blood are *anemia* and *leukemia*. In anemia there is either a diminished number of red corpuscles or too little hemoglobin. Two types of anemia, *primary* or *pernicious* and *secondary*, are distinguished. Secondary anemia is further divided into nutritional anemia, where the trouble is the lack of necessary blood-building elements in the diet, and cases that follow illness or a generally run-down condition.

Pernicious anemia. In pernicious anemia the number of the red corpuscles is greatly diminished, but each corpuscle carries

more than the average amount of hemoglobin. Persons over thirty are more liable to contract the disease, the greatest number of cases occurring from fifty to sixty. The disease begins slowly, the first symptoms being weakness and breathlessness. There is apt to be a loss of appetite, headache, and upset digestion. Examination frequently shows a diminished amount of hydrochloric acid in the stomach. There is no loss of weight, but the skin becomes yellow as it does in jaundice. In the latter stages there may be numbness in the hands and feet, loss of coördination, and sometimes paralysis.

The treatment in pernicious anemia is to remove any foci of infection that may be found, after which attention must be paid to food, fresh air, and rest. The diet should consist of iron-containing vegetables and fruits and a diminished amount of fats. Liver is considered a specific, and it is only since the value of this food has been discovered that this type of anemia has been treated with success. Liver extracts are now made which are as beneficial as the liver itself, and as this treatment must be persisted in even after apparent recovery, these extracts become valuable as a substitute for liver.

Blood transfusion is frequently used with great benefit in cases of



pernicious anemia. Repeated small transfusions are considered better than large single ones. The taking of hydrochloric acid must be continued, possibly for the rest of life.

FIG. 51. The lymphatic vessels and nodes of a part of the body.

Secondary anemia. In secondary anemia, not only is there a diminished number of red corpuscles, but the hemoglobin is low. It is more common in children and adolescents than in adults.

Cases of nutritional anemia are found commonly among young children who have been kept too long on a milk diet. Many large, heavy babies with especially white skins have this trouble. The difficulty is that iron is not present in milk, and if by the sixth or eighth month the child is not given yolk of egg or some other iron-containing food, the iron supply of the body becomes exhausted. "Milk anemia" can be produced regularly in young rats by feeding a diet that is in large part milk. It can be relieved by adding to the diet either iron or iron-containing foods. It is believed that very small amounts of copper must be present in the diet to allow the iron to be used. In our Southern states there are many cases of nutritional anemia among adults, due to a lack of lean meat and leafy vegetables in the diet.

In cases of anemia that are caused by infections with germs or worms, the first step is if possible to remove the infection. After this has been done the treatment consists of good hygiene (fresh air, sunshine, moderate exercise) and correctly selected food. Meat, leafy vegetables, and other foods containing iron are necessary. Cod-liver oil is useful, and treatment with the ultra-violet ray has been found beneficial.

Leukemia. In leukemia there is a marked increase in the number of white corpuscles, enlargement of the spleen and lymph nodes, and sometimes tenderness in the long bones. The cause of the disease is probably an infection.

The onset of the disease is slow. Among the early symptoms are anemia, pallor, dyspnea, and enlarged lymph nodes. The temperature is irregular, the digestion is upset, and there may be nausea, vomiting, and diarrhea. In acute cases, death may occur in from a month to six weeks.

The treatment consists of efforts to remove the infection. It includes rest and diet. Sometimes X-ray treatments are

used successfully, but they must be given with great care and skill.

Disease of the heart. Disease of the heart is by far the leading cause of death, and the number of deaths from this cause continues to increase each year. One reason for this fact is that our knowledge of how to prevent the onset of heart trouble is very inadequate. Another reason is the failure of many patients to consult a physician in time or to follow strictly the directions given by him. There are two types of heart disease, *functional* and *organic*.

Functional heart disease. In functional heart disease there is no change in the structure of the heart. The muscles of the walls and the valves are apparently in good condition, but the function or working of the heart is not normal. This type of heart disease may be due to disturbance of the nervous system; to lack of sleep or of correct food; to fatigue to the point of over-straining; to an anxious and disturbed mental state; to hyperthyroidism, a disordered digestion, or disordered kidney function; or the heart action may be interfered with by obesity or an excessive amount of gas in the intestine.

In functional heart disease the patient frequently becomes conscious of the heart action. Sometimes the heart beats with increased force and rapidity, and there may be a feeling of discomfort amounting to slight pain. These symptoms may all appear without a diseased condition of the heart, but it is advisable to have an examination made if they do appear; for functional heart troubles may throw strain on the heart that will later lead to organic trouble.

Organic heart disease. In organic heart disease there is some change in the heart itself. This condition may be congenital or acquired. The congenital type is rare and is due to a defective development of the heart or of the valves. The acquired cases of organic heart disease may be divided into three classes: (1) those caused by an infection, (2) those

caused by toxic and degenerative conditions, and (3) heart disease of later life, due to changes in the body because of old age.

Infections causing heart disease. In practically any of the general infections the germs may attack the heart and leave structural changes more or less serious. Diseases such as pneumonia, influenza, typhoid fever, rheumatism, measles, scarlet fever, syphilis, and many others may be followed by a diseased condition of the valves, of the muscles of the heart and blood vessels, or of the lining or covering of the heart. Rheumatism and syphilis are particularly injurious to the heart, rheumatism being the greatest cause of heart disease in the young (page 270).

As it is generally believed that the germ of rheumatism in many cases enters the body through diseased tonsils and teeth, it is most important that the mouths and throats of children should be regularly examined, and if diseased conditions are found, they should be remedied immediately. Growing pains and chorea (St. Vitus's dance) are evidences of rheumatism, and the cause of the condition or the focus of infection should be found and corrected before the infection is so spread through the body that the heart condition becomes serious.

Endocarditis is an inflammation of the lining of the heart and is caused by infection. In the chronic type of endocarditis the valves of the heart become involved. This diseased condition of the valves of the heart is much more common among the young than it should be.

A temporarily weakened condition of the heart occurs during convalescence from most of the severe cases of infectious diseases, and exertion soon after an illness may cause this condition to become acutely serious or may bring about a chronic involvement of the heart. Therefore, during the period of convalescence the patient should be guided entirely by the physician in determining how rapidly he should return to the activities of his normal life.

Toxic and degenerative conditions affecting the heart. Such conditions as Bright's disease, high blood pressure, gout, diabetes, and goiter may cause heart disease. The constant and excessive use of drugs, tobacco, alcohol, and possibly tea and coffee may damage the heart. A life without exercise, coupled with overeating and oversleeping, may be the cause of imperfect elimination and a toxic condition of the intestine which poisons the whole system and injures the heart.

Heart disease of later life. Another type of heart disease is that which develops in association with arteriosclerosis, or hardening of the walls of the arteries. This decrease in the elasticity of the walls of the arteries usually begins at about sixty years of age, although under some conditions it may appear much earlier. Its progress depends on the habits of life and the health of the individual. As a rule it develops very slowly, but in some cases the loss of elasticity advances quite rapidly. A life of poverty and privation, with poor food and unhygienic living conditions, attacks of illness, infected teeth or other foci of infection, all are believed to hasten hardening of the arteries.

The added force which must be used to send the blood through inelastic blood vessels causes a strain on the heart which is often followed by serious conditions. In general, in degenerative diseases such as Bright's disease and hardening of the arteries, the heart also becomes involved, and if the work of the heart is greatly increased, as by high blood pressure, hyperthyroidism, or too heavy labor, the heart is likely to become enlarged and to be damaged.

Athletics and the heart. The heart, like any other muscle, increases in size with exercise, but if the exercise is too severe or too prolonged, the heart muscle becomes fatigued and goes into a relaxed condition. There is a great difference of opinion as to the effect of athletics upon the heart. Some authorities believe that many persons are injured by the excessive amount of exercise taken in competitive games. Others feel that this

is not true unless there is already present some weakness in the heart.

Although this difference of opinion does exist, there can be no doubt that careful supervision should be given to those engaging in competitive sports. There should be frequent examinations of the hearts of athletes by experienced physicians, particularly before going into strenuous games. Especial care should be exercised not to overstrain the heart in rapidly growing adolescent boys and girls, for sometimes the heart in its growth has not kept up in size with the body and is easily overtaxed. Excessive and prolonged exertion of any kind, taken without preliminary training or due regard to the physical condition of the moment, may cause heart strain. Too heavy and too prolonged physical labor, or too strenuous effort in games, may have the same effect.

Prevention and treatment of heart disease. In the prevention of heart disease good hygienic living holds the place of first importance. Coupled with this, there should be a removal of all possible foci of infection; as far as possible an avoidance of exposure to communicable diseases, and use of all the recognized means of acquiring immunity during childhood; rest after illness long enough to prevent heart strain; intelligent coöperation with the physician during a convalescence and at other times; avoidance of excessive use of tobacco and stimulants of any kind; and sensible, reasonable hours of sleep and rest. Children with rheumatism should have special care. It is generally believed that an over-busy life, with too much excitement and strain, tends to bring on high blood pressure and degenerative changes in the arteries and heart walls.

As will be readily understood, recovery from a diseased condition of the valves and the heart muscles occurs more easily in the young than in those beyond middle life. The treatment consists, as a rule, of regulated rest, interspersed with the correct amount of exercise as soon as exercise can be

taken safely. The keynote of recovery in this disease, as in most others, is a constant and intelligent coöperation with the physician in charge of the case. Usually treatment over a considerable period of time is necessary; and failure to carry out the physician's orders may rob the patient of his chance of recovery.

QUESTIONS

1. What is the function of the blood?
2. Distinguish between the systemic and the pulmonary circulatory systems.
3. Into what compartments is the heart divided?
4. Distinguish between arteries, capillaries, and veins.
5. Describe the walls of the blood vessels.
6. Upon what does blood pressure depend?
7. How may blood pressure be increased?
8. Describe the blood.
9. Where are the red corpuscles found, and what is their work?
10. Describe the white corpuscles and their function.
11. What is lymph?
12. Describe the lymphatic vessels and the lymph nodes and give the function of each.
13. What is anemia? leukemia?
14. What two forms are there of anemia, and what is the treatment for each?
15. What is the probable cause of leukemia, and what is the treatment?
16. Distinguish between functional and organic heart disease.
17. What causes are there of organic heart disease, and what measures are suggested for preventing and alleviating the condition?
18. Why should athletics be under the supervision of a medical director?
19. Mention some important points in the prevention and treatment of heart disease.

CHAPTER SEVENTEEN

THE DUCTLESS GLANDS

A GLAND is an organ that secretes. Some of the glands — for example, the sweat glands, the liver, and the salivary and other digestive glands — have ducts that carry the secretion from the gland. Another class of glands is ductless. The chemical substances that they build diffuse directly into the blood and are carried by the blood throughout the body. In medicine these glands are usually spoken of as the *endocrine* rather than as the ductless glands. They are also referred to as the glands of *internal secretion*.

Only very recently in medicine has anything been known of the functions of these glands. Even yet the men who have spent years in the study of them feel that only a beginning in understanding them has been made. Yet for two reasons a chapter on them is introduced in this book.

The first reason is that enough is now known to make us realize that the health and development of children are dependent upon a normal condition of the ductless glands, and that much illness in adults can be relieved by improving the functioning of some of these glands or by the use of extracts from them. In the hands of careful physicians, gland extracts, even with our present knowledge, are a great boon to mankind.

The second reason is that there is great interest in the effects of the secretions of the endocrine glands and quacks are selling directly to the public drugs which are supposed to be gland extracts. These drugs either contain no such extracts or they are too powerful and dangerous to be used without medical advice. The public needs clearer and fuller knowledge of the body and how it is affected by chemical substances to insure better coöperation with physicians and to prevent the taking of advertised medicines without proper supervision.

Internal secretions, or hormones. No organ in the body exists alone, but each is affected by the others. There are two ways by which one part influences the other parts. The first way is through the nervous system. The other is by means of chemical substances. These chemical substances are spoken of as *hormones*. Each of these is produced in some one organ and released into the blood. It is the function of the ductless glands to produce hormones that affect the activity of the other body parts.

The growth and development of the body are largely under chemical regulation, as are also the nutrition and the other major chemical processes that go on within the body. With the hormones, or regulators, present in the right amounts, the various parts and organs work together in harmony. Without the hormones or without the proper balance of them, all is physiological disarray.

The ductless glands. The known ductless glands are the thyroid, parathyroid, thymus, adrenal or suprarenal, pituitary (*hypophysis cerebri*), pineal (*epiphysis cerebri*), and the sex glands (ovaries and testes). In addition there are areas of endocrine tissue (Islands of Langerhans) in the pancreas, and the liver produces certain hormones that stimulate the production of red corpuscles and regulate the pressure of the blood.

The sum total of all the chemical changes in the body is known as its *metabolism*, and to a very marked degree the metabolism is regulated by the hormones of the endocrine glands.

The thyroid gland. The thyroid is the largest of the endocrine glands, and its function is the best known. It lies against the sides of the neck and consists of two flat lobes joined across the front (Fig. 52). It is richly provided with blood vessels and lymphatics, and is larger in the female than in the male. It increases slightly in size during the menstrual period.

The thyroid secretes a substance, *thyroxin*, which increases the rate at which the food is oxidized within the body. If too

much thyroxin is produced, the food burns too rapidly in the body ; if not enough is produced, the food burns more slowly than is normal.

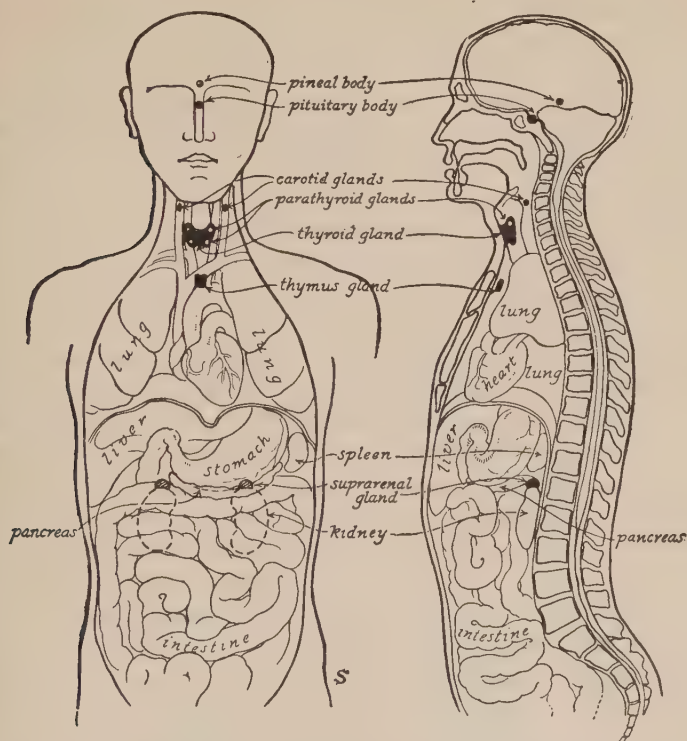


FIG. 52. Diagram showing the location of some of the ductless glands in the body. The thymus in early life is larger than most of the other ductless glands. Little is known of its function or of that of the pineal gland, while the function of the carotid glands is quite unknown. The effects of the secretions of the other glands shown in the drawing are discussed briefly in the text, but the whole subject is so new that our knowledge of it is very incomplete.

The basal metabolism test. This test measures the rapidity with which food is burned in the resting body. By it the activity of the thyroid is determined. The subject is made to

inhale pure oxygen for a definite time, and the amount of the oxygen that is used in the body is measured. From this it is known how much oxygen is being used in the burning of food, and this is compared with the amount that is normal for the height, weight, age, and sex of the patient. If the patient is using less oxygen than normal, it is judged that there is deficiency in the amount of thyroid secretion; a condition of *hypothyroidism* exists. If more oxygen than normal is being used, it indicates an excess of thyroid secretion; a condition of *hyperthyroidism* exists.

Eating or exercise of the muscles increases the body metabolism; so the test is made before food is taken in the morning, and the subject is required to lie relaxed and quiet for a half hour before it begins.

Symptoms of hypothyroidism and hyperthyroidism. For the final diagnosis of hypothyroidism and hyperthyroidism, physicians depend on the basal metabolism test. There are, however, certain symptoms that give an indication of the activity of the gland. A person with an insufficient amount of thyroxin is likely to have a dry skin and dry hair, to sweat with difficulty, to lack energy and endurance, to lack appetite, and to be overweight. Cretinism and myxedema are extreme conditions of hypothyroidism that will be discussed later.

In hyperthyroidism there is in general a reversal of the symptoms of hypothyroidism. The patient is alert, nervous, and restless. There is a tendency to a fast heart beat, to a trembling of the hands, to an excess of perspiration, to increased appetite, and to loss of weight. In this condition the thyroid may be normal in size or it may be enlarged. The most frequent cause is believed to be focal infection, for many patients recover quickly after a focus of infection has been removed.

The symptoms of hyperthyroidism as a rule develop slowly. At first there may be only unusual activity, increased appetite, sleeplessness, and restlessness, with a general nervous condition. Mild cases of this disease may occur and disappear

without treatment. This is often true of the disease in adolescents. Sometimes an excessive amount of exercise, or failure to take the rest prescribed by the physician, will cause what has been a mild case to go on and develop until it becomes Graves's disease or exophthalmic goiter (page 171). Since some cases of hyperthyroidism do not do this, a distinction should be made between mild hyperthyroidism and the more extreme condition into which some cases develop.

Cretinism. Cretinism is a hypothyroid condition found in some children in whom there is either imperfect development of the thyroid gland, or possibly later atrophy of it. In this disease there is an interference with the growth of the child; the bones are soft; the legs are poorly formed and hardly strong enough to hold the body upright; the abdomen is large and pendulous; the face swollen; the hair coarse and scanty; and the skin thick and dry. The child is mentally behind others of its age, and may even be idiotic.

This condition can be improved rather quickly by the administration of the extract of the thyroid gland. At the first symptoms indicating the possible presence of such a condition, the child should be put under the care of a good physician.

Myxedema. Another hypothyroid condition, found in both children and adults, is myxedema. In this disease there is an increase in weight, the hair becomes dry and falls out, the skin becomes dry, the pulse is slow, the expression of the face is heavy and rather stupid, and the mind dull. The person is nervous and irritable, and the disease, if not cured, may result in idiocy. This too may be cured by the administration of thyroid extract. In other conditions of hypothyroidism that are not so extreme, there may be amenorrhea (unnatural stoppage of the menses), slow growth in children, hysteria, a tendency to obesity, drowsiness, and a general low condition of vitality.

Goiter. Goiter is an enlargement of the thyroid gland. The enlargement may be of the entire gland or only of one lobe.

There are two types, *simple goiter* and *exophthalmic goiter*, or Graves's disease.

Simple goiter is very common in certain areas. It is more likely to appear in girls than in boys, and there is especially likely to be an enlargement of the thyroid at about the age of adolescence. There may be no adverse symptoms, unless the gland grows to a size that causes pressure and interferes with respiration and swallowing. It is unsightly, however, and it should always have the attention of a physician.

The usual cause of simple goiter seems to be a lack of iodine. The secretion of the thyroid gland, thyroxine, is an iodine compound, and if the food does not supply enough of this element the gland enlarges. In certain regions (e.g., parts of Switzerland, Michigan, Ohio, and Montana) simple goiter is exceedingly common in both men and animals. In these areas it has been found that the soils and the foodstuffs produced on them are unusually low in iodine content, and if iodine is supplied the thyroid enlargement can be prevented. In most goitrous areas iodized salt is now used, and in some places chocolate wafers containing iodine have been distributed through the schools. Where iodine in addition to that furnished by the food is needed, it should be supplied, and it is especially important that it be provided for young girls. Sometimes in the treatment of simple goiter physicians use thyroid extract as well as iodine.

Exophthalmic goiter is a much more serious disease than simple goiter. As has been stated, it usually begins as a more or less mild hyperthyroidism. The later and more serious symptoms are gastro-intestinal disorders, tachycardia (extremely rapid pulse), trembling of the fingers and hands, protrusion of the eyes, flushes of heat accompanied by excessive perspiration, and increased metabolism.

In treatment the first thing necessary is to search for a possible focus of infection. Tonsils, sinuses, gall bladder, appendix, and teeth should be examined, and if there is infection it

should be cleared up. Next (and this is most essential in all cases of this nature) there must be rest and freedom from excitement and irritating surroundings. The diet should be regulated and such medicines given as the physician considers necessary. If recognized early, this disease may often be treated successfully in this way, but an absolute coöperation on the part of the patient with the doctor is necessary. X-ray treatments are sometimes given successfully. If the disease does not yield to these treatments, an operation may be necessary. This operation consists of a partial removal of the thyroid gland. It should be done by an experienced surgeon, preferably in a hospital where the patient can be carefully nursed.

The parathyroid gland. This gland is as a rule formed of four small, rounded masses. They lie two on each side of the neck and are embedded in fat and fitted into notches in the thyroid gland. Complete removal of the gland is followed by tetany, in which there is increased rapidity of breathing, trembling, contraction and rigidity of the muscles to the point of convulsions, rapid emaciation, and death.

The parathyroid gland assists in maintaining the concentration of calcium in the blood serum. If there is too little of the secretion, the calcium in the blood is low. Tetany and paralysis agitans (a jerking movement of the head) are two conditions that are brought about by a lack of the secretion. The extract of the gland is now quite frequently used in conjunction with the ultra-violet lamp and calcium given by mouth in the treatment of calcium deficiency of the blood.

In certain cases of tumor of the parathyroids there is too much secretion. In this condition the blood calcium is higher than normal. Due to a tendency for the calcium to be withdrawn from the skeleton and excreted from the body, the bones often become light and flexible, and sometimes tumorous growths form on them.

The suprarenal or adrenal glands. These glands are found one just above each kidney on each side of the spine in the back of the body cavity. Each gland consists of a central part, the medulla, and of an outer or cortical part.

The medulla secretes a substance called *epinephrin* (adrenalin), which causes contraction of the heart and the muscles of the blood vessels and helps maintain the force of the heart beat and normal blood pressure. At times of stress and emotion there is a marked increase in the amount of adrenalin discharged into the blood, and this raises the percentage of sugar in the blood, adds to the tone and efficiency of the muscles, and gives extra power of resistance against fatigue.

The extract of the medullary portion of the gland (epinephrin) is employed for several purposes in medicine. One use is to check hemorrhages. A solution of it is applied to the wound, where it causes the walls of the small arteries to contract and cut off the blood. It is also sometimes applied as a spray or an ointment in hay fever and other congested conditions of the mucous membranes to relieve the congestion. A third use is as a heart stimulant in cases of shock and collapse, as after an operation. Like some of the other gland extracts, epinephrin is a powerful drug and should be used only under the direction of a physician.

The function of the secretion of the suprarenal cortex is not so well understood. A deficiency of it seems to cause a low basal metabolism and a condition of weakness and easy fatigability. A rather rare and very serious disease (Addison's disease), in which the symptoms are exhaustion, weak pulse, and sometimes pain and vomiting, is due to a lack of the cortical secretion and is relieved by injection of it. Life is possible in an animal for a considerable time without epinephrin, but if the cortical secretion is lacking death comes in a very short time.

The thymus gland. Among the glands not yet thoroughly understood, but which are being studied with an increased

realization of their importance, is the thymus gland. This gland is present at birth, gradually increases in size until about the fifteenth year, and then begins to decrease until it practically disappears at the age of twenty-five. The fact that the thymus exists only during the time of growth would indicate some function connected with that period of life, but in spite of the great amount of study which has been given to it, nothing is really known about its secretion.

The size of the thymus gland in different individuals varies, and in infants and in young children the space in which it lies is so small that an enlarged gland may press upon the trachea. This may cause: (1) a high-pitched piercing cry in an infant, which is increased by prolonged crying or coughing, and (2) an asthmatic condition in which the breathing is carried on with difficulty. Associated with an enlarged thymus is a third more serious condition, lymphatism, in which there is an abnormal growth of lymphoid tissue in the spleen, the tonsils, the superficial lymph nodes, and elsewhere, as well as in the thymus.

In this latter disease there is lowered vitality, impaired development, and sometimes death. Children with this disease are often fat, and when measured by height and weight standards rank high, but they are flabby and probably anemic. They are unusually susceptible to infectious diseases and are easily upset by slight ailments. Mouth breathing is common, and they frequently have nasal catarrh. After a fit of crying or of temper the breathing at first may be noisy; then the breath may be held for some seconds, while the child becomes cyanotic (blue in the face). As a rule this condition passes off after some seconds, but death from it has been known to occur.

Diagnosis of enlarged thymus is difficult in some cases because of the natural variability in the size of the gland; but by X-ray photography the diagnosis can be made, and treatment by X-ray is very successful. Other treatment consists

of careful dieting, in which the amount of sugar and starches is kept small and skim milk, eggs, meat, green vegetables, and fruits are used liberally.

During the past two or three years it has been the unfailing rule in one of the hospitals in Washington, D. C., to X-ray children before operation to be sure the thymus is not enlarged. This custom has come about because, in two or three cases when children have died under the anæsthetic, post-mortem examination has shown every part of the body to be normal except the thymus, which in each case was decidedly enlarged. No child with an enlarged thymus is now operated on in this hospital, but X-ray treatments are given to reduce the gland before operation. The exact reason for an enlarged condition of the thymus is not clear, but it is believed that it is due to some focus of infection.

The pineal gland. The pineal gland is a very small gland located on the upper surface of the brain, deep down between the halves of the cerebrum. Very little is known of its function; but some authorities believe that the effect of its secretion is to favor growth and development, and the extract of the gland has been used in the treatment of backward children.

The pituitary gland, or hypophysis. The pituitary is a small gland attached to the lower side of the brain. It lies in a little pocket in the floor of the cranium above the back of the mouth and has two lobes, an anterior and a posterior. Each of these lobes has its own function.

It is believed that the anterior lobe secretes four different hormones. One of these stimulates the growth in length of the bones. An abundance of the secretion in early life leads to tallness, and an excess causes giantism. Later in life an excess causes a disease in which the hands and feet become enlarged. If this condition is not arrested, the whole body may become involved: the head becomes abnormally large, the ears big, and the patient heavy and stupid. A deficiency



FIG. 53. The giant and the dwarfs of a circus. The great height of the giant (about eight feet, six inches) is due to too much secretion from the anterior lobe of the pituitary gland. The small stature of the dwarfs is caused by a deficiency in this secretion.

in this hormone leads to defective growth and low stature, sometimes even to dwarfism.

Other hormones secreted by the anterior lobe seem to control

sexual maturity and the development of the body. If the anterior portion of the gland is removed, death ensues; but this is not true if only the posterior portion is removed.

The posterior lobe produces three distinct substances. One of these assists in the regulation of the carbohydrate metabolism; for an excess of secretion may cause an excess of sugar in the blood, while a deficiency in secretion decreases the assimilation and leads to production and accumulation of fat. The other secretion affects the involuntary muscles and assists in the control of blood pressure, an increase in secretion causing high blood pressure. It also causes the tissues to retain water, those having a low amount tending to be thin and dry and those having an abundance of it to be watery and heavy. The third substance causes a secretion of milk by the mammary glands.

As it is impossible to remove the pituitary gland as a whole without causing death, it is evident that the gland must have some other important function that is not yet fully understood.

The endocrine function of the pancreas. The main body of the pancreas secretes a digestive juice which is poured into the intestine through the pancreatic duct, but the islands of endocrine tissue produce a very important hormone, *insulin*. This increases the oxidation of the sugar in the body, and if insulin is not present in sufficient amount, sugar accumulates in the blood and escapes into the urine. This condition is called *diabetes*.

The insulin which is used in the treatment of diabetes is an extract taken from the endocrine part of the pancreas. Diabetes is a very common disease, and there is much reason to believe that overburdening the Islands of Langerhans through over-consumption of sugar and starch is an important cause of it.

The hormones of the liver. In addition to the production and excretion of bile, the liver forms several hormones. One of these increases the production of red blood corpuscles, and

feeding with liver or liver extract is the most effective way of treating a certain type of anemia. Another liver hormone helps in regulating the amount of sugar in the blood, and a third affects the tension of the arterial muscles and is thus a factor in the control of blood pressure. It is quite possible that other liver hormones will be isolated, for the liver is by far the largest glandular mass in the body and its functions are very complex and only in part understood. There is reason to believe that allergy is caused by defective liver function.

The ovaries. The ovaries have two functions. One is reproduction, and the second is the production of a secretion which affects the development and functioning of the other organs. If in girlhood the ovaries are removed or fail to function, there is a lack of development of the body and sometimes of the mind. If they are removed later in life but before the menopause, an artificially produced menopause with nervous disorder occurs. Even later in life, after the menopause, there may be a return of symptoms which may resemble those of the menopause and which can be relieved by the administration of an extract from the ovary. This drug should not be used without a doctor's order and supervision, as it should be taken carefully, with periods of rest during its administration.

Future study of hormones will doubtless reveal many other secretions, and a more practical knowledge of the functions of those secretions already identified will be reached. At present we hear many false and ridiculous statements and claims made by those who have only a half knowledge of the endocrine glands, or who wish to use the public interest in this subject to sell worthless or even dangerous drugs. Also, we hear much of the mistakes and failures of those physicians who have used gland extracts with their patients. Yet it must be admitted that much has been learned of these interesting substances in a very short time, and that our knowledge of them has great

practical value. Many chronic and supposedly hopeless cases have already been cured by the use of endocrine preparations, and much has been done to aid the development of children who suffer from glandular deficiency.

One fact that should be clearly in mind is that the ductless glands affect each other. In most cases of endocrine trouble one gland in the beginning may be chiefly affected, but as the disease progresses other glands become involved until the entire endocrine system is out of balance. The primary reason for the coming on of a disorganized functioning of the glands is often obscure, but in many cases the causes have been found. Among the causes recognized are predisposition through heredity; infections such as tuberculosis, syphilis, typhoid fever, the eruptive fevers, rheumatic fevers; chronic foci of infection; lowered power of resistance brought on by shock, worry, anxiety, and overwork; rickets, intestinal disorders, and injuries; excessive use of tobacco, alcohol, and drugs; and a fevered, rushing life of excitement and strain.

Some of these conditions and causes we cannot control, but others we can. Rickets can be prevented; care can be taken not to expose children to communicable diseases; typhoid fever can be prevented; tuberculosis can be recognized and often quickly cured; intestinal disorders can be treated promptly; tobacco can be used in moderation or not at all, and alcohol and drugs avoided; and foci of chronic infections can be found and eliminated.

Last, but not least, we can by sensible, hygienic living keep our bodies in the healthy condition that will raise our resistive powers against infections, and we can protect ourselves against the emotional strains and storms that lead to endocrine imbalance and exhaustion.

QUESTIONS

1. What is a gland?
2. What is the distinction between the ductless glands and other glands?
3. Why is it considered important to understand the functions of the ductless glands?
4. What are hormones?
5. Name the most important ductless glands.
6. What is meant by the "basal metabolism test"?
7. What are hypothyroidism and hyperthyroidism?
8. What is the treatment for mild hyperthyroidism?
9. Describe a simple goiter, giving its symptoms and cause.
10. Why is exophthalmic goiter more serious than simple goiter?
11. Where are the adrenal glands, and what are their functions?
12. During what years is the thymus gland active?
13. What is the treatment for enlarged thymus?
14. What are the functions of the pituitary gland?
15. What disease occurs if there is a deficiency of the hormone of the pancreas?
16. What important functions has the liver?
17. Mention some of the causes of the disorganized functioning of ductless glands.
18. In what ways can we control many of the conditions that lead to improper functioning of these glands?

CHAPTER EIGHTEEN

CANCER

THERE is no problem upon which physicians have spent more time and thought than that of cancer. Yet in spite of the many years of careful clinical and laboratory studies, and countless experiments on animals, no really satisfactory results have been obtained. The cause of cancer is still unknown; we have failed utterly to find a way to prevent it; and in treatment no such results have been attained as in the treatment of diseases such as tuberculosis, diphtheria, and malaria.

It is true, nevertheless, that progress has been made to a point where, if it were possible to get intelligent coöperation between physicians and the public, at least one third of the deaths which occur from this disease could be prevented.

What cancer is. The human body begins with a single cell. This grows and divides until it forms a great mass of cells. As the body grows, various groups of these cells become differentiated (changed from general to special) to form the different tissues — muscles, nerve tissue, skin, connective tissue, bones, glands, and other tissues in the different organs and body parts.

In normal life, growth continues until each organ has attained the proper size. In some parts of the body (e.g., the epidermis, many glands, lymph nodes) there is continued multiplication and growth of the cells throughout life to furnish replacements for cells that are broken down and destroyed. Always, however, under normal conditions this growth is under control. The forces that stimulate it are held in check by regulatory forces that keep the growth and multiplication of the cells within certain bounds.

Cancer is uncontrolled growth. A cancer is formed by a group of cells beginning to multiply and continuing to grow and multiply far beyond the normal amount. The regulatory

forces lose control of the growth processes, and we have a run-away group of cells.

Some investigators believe that the excessive growth of tumor tissue is due to some change in the cells themselves. Others are looking for the cause in the lack of growth-regulating hormones, perhaps from one or more of the endocrine glands. It is not believed that tumors are either communicable or inheritable.

Multiplication of cells caused by irritation. Heavy work causes the epidermal cells to multiply and form calluses on the hands. A tight shoe causes the development of a corn. Fungi and bacteria may cause overgrowth of the cells and the formation of knots and excrescences in plants. And cancers have been repeatedly caused in animals by applying coal tar and other chemicals to the skin.

It is believed that chronic irritation, either chemical or mechanical, tends to start the cells into cancerous growth. In most persons the regulatory processes check the growth tendencies before harm is done, but in others there seems to be a constitutional predisposition to overgrowth of the cells. Age is a very important factor in this predisposition. Most cases develop in persons past forty years of age.

Treatment of cancer. Thus far only two recognizedly effective treatments for cancer have been found — surgery and radium or the X-ray.

In the surgical treatment of cancer the idea is to cut out and remove completely from the body the malignant tissue (see note, page 183). In the other treatment the cancerous part is irradiated with rays from radium or an X-ray bulb.

Formerly it was supposed that cancerous tissue was more easily affected by these rays than normal tissue, and that by proper dosage the cancer cells could be killed while the normal cells were left uninjured. This view is still held by many investigators, but it is now also believed that the growth of cancer is checked by the white corpuscles devouring the

malignant cells, and some investigators hold that the chief effect of radium or X-ray treatment is to stimulate the multiplication and activity of the phagocytes (see page 189).

Importance of early treatment. In its first stages a cancer is a very small collection of abnormally growing cells — perhaps in the very first stage only a single cell. These cells multiply, and the mass increases in size. Cordlike extensions (“roots of the cancer”) grow inside the lymphatic vessels, absorbing their nourishment from the lymph. At times little groups of these cells may be loosened from the mass and float along in the vessel until the first lymph node is reached. Here they set up a new center of growth, and in time they may work their way through the node and on to the next one, until finally the malignant cells are scattered throughout much of the body.

The only hope of success in treatment lies in beginning the treatment early. If a surgeon can cut about the growth while it is still localized, and remove everything within the circle he has laid out, there is every reason to expect a cure. But if the disease is allowed to run on until the cancer cells have spread and there are many secondary (metastatic) centers of growth in different parts of the body, removal of all the malignant tissue is very difficult and often impossible.

For this reason the only sensible course to follow when a growth or other symptom of cancer is discovered is to go to a physician *at once* and insist on an immediate diagnosis and, if it is needed, prompt treatment. Under no circumstances should massage or osteopathic or chiropractic treatment be permitted, for this may loosen groups of the cells and rub them along the vessels, thus spreading the growth to new parts.

Cancer of the breast. In women, cancer occurs frequently in the breast. As a rule it is first discovered as a small lump, and if a lump appears in the breast, there should be no delay in consulting a physician and surgeon. It is almost always considered advisable to remove a growth of this kind, lest it be

malignant or become malignant.¹ But whether removal is advisable in any particular case is a matter for a specialist to decide. If the lump is not removed, it should be examined at close intervals by a physician to make sure that it retains its benign character. A small lump may remain in an apparently harmless condition for a long time in the breast, and then at the menopause or because of some irritation may enlarge and develop into a cancerous growth.

The operation for the removal of a small benign growth from the breast is not a disfiguring one, but if the tissues have broken down and the tumor has infiltrated into them and reached the neighboring lymph nodes, the whole breast and the lymph nodes in the axillæ (armpits) must be removed. Unfortunately many women conceal the fact that a growth is present until the tumor has so spread that a very serious operation is necessary, and often until the case has reached that stage when it is no longer wise to operate.

The one safe rule to follow is to consult a surgeon at once if a growth appears in any part of the body, and if an operation is advised, to have it performed immediately. A delay of weeks, or even a few days, may be dangerous.

Cancer of the uterus. The early symptom of cancer of the uterus is a bloody discharge from the uterus. This may occur either during or before the menopause, but because of the rather universal belief that an excessive menstrual flow during the menopause is to be expected, the bleeding at this time is often not recognized as a symptom of cancer.

¹ Physicians class tumors as *benign* and *malignant*. A benign tumor usually has a sheath, or capsule, about it, and it pushes the other tissues aside as it grows. By pressure it may cause trouble, but in general it does not destroy the other tissues or greatly affect the general health.

A malignant tumor, on the other hand, has no wall about it, and it pushes out among the surrounding tissues and destroys them as it advances. It tends to spread indefinitely, feeding and growing at the expense of the other cells. A cancer is a tumor of this kind. Sometimes benign tumors change into malignant ones, and all growths should therefore be carefully watched.

It is true that there may be bleeding when no cancer is present, but because of the possibility of cancer, particularly during the menopause period, an examination should be made if unnatural bleeding occurs. If the flow should appear at some period after the menopause has passed, it is a very definite indication of an unhealthy condition in the uterus and a medical examination should be made at once.

Cancer of the stomach and bowels. Other common situations for development of cancer are the stomach and the bowels. In these locations the disease is much more difficult to recognize, but with the X-ray and chemical and microscopic examination of the contents of the stomach and intestines, it is quite possible to make the diagnosis.

The early symptoms are indigestion, loss of appetite, loss of weight, anemia, and general weakness. These symptoms appear in other diseases also, but when they appear a careful physical examination should be made to determine the reason for their presence. Particularly if the sufferer has reached or is beyond middle age, should these symptoms be viewed as possibly indicating cancer of the digestive tract.

Cancer of the mouth. Cancer in the mouth is caused by constant irritation of the mucous membrane or tongue. This irritation may be caused by a jagged or sharp-edged tooth, from constantly biting the tongue, from holding nails or pins in the mouth, and especially from ill-fitting dental plates. The excessive use of tobacco is a common cause of cancer in the mouth. This was for many years confined almost entirely to men, but with the increased use of tobacco by women it is also being found in their mouths.

An unclean condition of the mouth and teeth sometimes causes cancer. Not only should the mouth be kept clean, but if an ulcer or a sore in the mouth does not heal quickly, a dentist or a physician should be consulted.

If cancer of the mouth is treated in its early stages, it is curable; but if neglected, it spreads rapidly until it may in-

volve the glands of the neck. Then the condition becomes serious. In its advanced stages cancer of the mouth and glands is very painful, and the treatment at this stage is also painful and the chance of recovery is greatly lessened. Treatment of cancer of the mouth may be by cautery, by X-ray, by radium, or by surgery; or it may be by a combination of these.

Skin conditions leading to cancer. There are several conditions of the skin which may become cancerous; chronic and neglected ulcers, some forms of cysts (sacs containing liquids or semisolids), and some types of moles may under irritation become cancerous. Moles and cysts are practically always harmless unless they become irritated by pressure or rubbing. A mole should never be handled or squeezed, nor should it be removed or treated by anyone except a skilled surgeon. If a mole is in a part of the body where it is rubbed by the clothing, it should be protected from rubbing, and upon the first appearance of irritation the advice of a physician should be sought.

No persistently inflamed part of the body should be neglected, but it is not necessary to be nervous and constantly anticipating a cancer, or sickness of any kind. Common sense should help in keeping the mental balance so that there will be no causeless worrying over physical conditions or constant anticipation of trouble. At the same time, neglect of adverse symptoms which may indicate sickness or disease until conditions have become serious is anything but common sense. It is better to consult a physician many times unnecessarily than to fail to consult him the one necessary time.

Periodical medical examinations are advisable for many reasons. They are helpful not only because they are the means of early diagnosis if there is a condition requiring treatment, but also because, if a thorough general examination reveals a sound condition of the body, one need not waste time in dreading troubles which do not exist.

QUESTIONS

1. How do the cells in the body grow normally?
2. What is there abnormal in the growth of the cancer cells?
3. What is one cause of this multiplication of cells?
4. What are two recognized treatments for cancer?
5. Why is early treatment necessary?
6. How does cancer in the breast usually first appear?
7. What is the difference between a benign tumor and a malignant tumor?
8. What is the first symptom of cancer of the uterus?
9. What are the early symptoms of cancer of the mouth?
10. What are some of the causes of cancer of the mouth?
11. How can cancer of the mouth be treated?
12. What conditions of the skin sometimes lead to cancer?
13. What attention should be paid to moles to prevent cancer?
14. Why are periodical physical examinations advisable?

CHAPTER NINETEEN

IMMUNITY

THERE are two general methods of combating infectious diseases. The first is by preventing the spread of the germs. Safe methods of sewage disposal, the protection and purification of water supplies, the pasteurization of milk, the destruction of mosquitoes and flies, and the isolation of patients ill with communicable diseases are sanitary measures carried out to prevent the spread of germs.

The other general method of combating an infectious disease is by raising the immunity of the persons who might be attacked until they are able to resist the germs of the disease. Vaccination against smallpox, inoculation against typhoid fever, and injection of antitoxin to prevent diphtheria are examples of methods that are successfully used in increasing the resistance against certain diseases.

In recent years raising the immunity of the body by the use of serums and vaccines has become one of the greatest branches of medicine; and the effects of food, sunlight, exercise, and other factors of our environment on our resistance to germs is fast becoming a major division of hygiene. We shall therefore, in this chapter, discuss briefly some of the more important facts that have been established regarding immunity.

Natural and acquired immunity. Immunity may be either *natural* or *acquired*. Natural immunity is an inborn quality by which a race or an individual shows resistance to a disease. The lower animals are by nature resistant to most human diseases, and we are resistant to most animal diseases. The Mongolian race is more resistant to scarlet fever, and the Negro is more resistant to yellow fever and less resistant to tuberculosis, than the white race. Some diseases most often attack children, while others are more common in adults or in the aged; thus age is also a factor that affects our natural immunity.

Even individuals of the same age and race vary greatly in their natural susceptibility to the various diseases to which they are exposed, and the various tissues of the body likewise possess different natural immunities. Thus the malaria germ lives in the red blood corpuscles, the germ of rabies and of infantile paralysis in the nerve tissues, the germ of dysentery invades the intestinal tract, and the pneumonia germ is found most frequently in the air passages and lungs. In children the tuberculosis germ grows chiefly in the lymph nodes and bones, while in adults it usually attacks the lungs, thus showing that the tissues vary in their immunities with change of age.

Acquired immunity is gained after birth. It may follow an attack of a disease, as of measles or chicken pox. Sometimes, as in diphtheria and scarlet fever, it appears without an open attack of the disease, probably because of slight infections that are checked before the person becomes seriously ill. Against many diseases immunity can be produced by vaccination with weak germs, dead germs, or toxins, or by the injection of serum or blood from an animal or person that is immune. As persons grow older they usually acquire immunity to many infections to which infants are susceptible.

Active and passive immunity. Acquired immunity may be either *active* or *passive*. In active immunity the body cells and tissues themselves produce the substances that make them immune. Thus the immunity possessed after an attack of measles or after vaccination against smallpox is due to the body's own reactions against the germs that have been introduced into it.

In passive immunity, on the other hand, the body does not produce its own protective substances. These are formed by another person or by an animal, and are injected into the blood, or where they will be absorbed into the blood, of the person who is being made immune. The antitoxins that are used in diphtheria and tetanus are secured from horses, and the convalescent serums that are being more and more frequently

used are made from the blood of persons who have recovered from attacks of disease.

Against many diseases active immunity is lasting. One attack of measles or smallpox usually protects for life. Passive immunity, however, is usually of short duration. In a few weeks at most the protective substances introduced into the blood have been destroyed or excreted from the body and the immunity is gone.

How the body resists infection. The body defends itself against germs in the following three ways :

(1) *By the production of lysins.* These are substances that digest or destroy the invading organisms.

Normal blood will destroy many kinds of germs, and by vaccination with weak or dead germs the blood of the person or animal can in many cases be given increased power to destroy germs of that kind.

(2) *By antitoxins.* These are substances which counteract or neutralize the effects of toxins produced and released by germs in the body. An antitoxin does not kill the germs, but it helps to protect the body from their poisons until the germs can be disposed of in other ways.

(3) *By phagocytosis.* In this process the larger white corpuscles of the blood, and certain other cells of the body, engulf organisms that invade the tissues. In a successful fight against infection, these cells not only swallow the germs but digest and destroy them. Substances called *opsonins*, which cause the cells to take up the germs more readily, appear in the blood during attacks of certain diseases.

Against some diseases the body seems to depend chiefly on one of these methods of defense, and in other diseases on other methods ; so when we try to raise the immunity we must use different methods according to the germ which we are combating. The substances produced in the body because of the introduction of germs or their products (or of any foreign materials) are in general known as *antibodies*.

Developing active immunity. In modern medical practice, active immunity against many diseases is produced by the introduction of germs (living or dead) or of germ toxins. In smallpox living germs of a type of low virulence toward human beings are used in vaccination, and an immunity to the more highly virulent type of the germ is developed. In preventive inoculation against typhoid fever, pneumonia, whooping cough, and colds, cultures of the germs that have been killed by heat or by chemicals are used. In immunization against diphtheria there is injected a toxin which has been so treated that its poisoning power is largely removed while its ability to stimulate the production of antitoxin is retained.

In all these cases the germs or their products are introduced into the body, and by its own activities the body forms substances which cause the destruction of the foreign material. The immunity conferred is active and of the same nature as is conferred by an attack of the disease.

As might be anticipated, attempts to build up active immunity can be successful only when there is time for the body to get its defensive mechanism into operation. Vaccination is used to *prevent* many diseases, to build up immunity before surgical operations, and in the treatment of long-drawn-out chronic infections. Where quick results are necessary, we must rely on passive immunity for reinforcement of the natural defenses.

Production of passive immunity. Passive immunity is induced by the injection of blood serum (plural, *sera*) taken from an animal or person that is immune to the disease. Thus diphtheria antitoxin is secured by injecting into a horse repeated doses of diphtheria toxin, and then bleeding the horse and obtaining the serum. The convalescent serum used in infantile paralysis is obtained by bleeding persons who have recovered from the disease.

One great advantage of sera such as these is that the antibodies in them are already prepared, and when they are

injected into the body they produce their effects very quickly. For this reason they are highly valuable for treating acute diseases and for giving temporary immunity to those who have been exposed to such diseases as diphtheria, scarlet fever, and measles.

Only certain germs produce free toxins in cultures, but when the toxins can be secured, very effective antitoxins can be produced from animals. Attempts to build up the passive resistance through the use of animal sera containing lysins and opsonins have been much less successful, but convalescent or immune human sera seem to be directly effective against certain germs.

Vaccines and sera. Originally the term "vaccination" (Latin *vacca*, cow) referred only to inoculation with cowpox virus, but the meaning of the term has been extended until it is now often used to mean the injection of any kind of germ, or even of toxins, pollen, or any foreign substance that causes the formation of an antibody. The material that is introduced into the body is called a *vaccine*, and many bacterial vaccines (sometimes called *bacterins*) are now employed. These, according to the origin of the germ, are classed as *stock vaccines* and *autogenous vaccines*.

A stock vaccine is prepared from stock cultures kept in the laboratory. An autogenous vaccine is made by taking a culture from the patient's own infection and preparing the vaccine from this culture. The supposed advantage of the autogenous vaccine is that some kinds of germs have many varieties differing somewhat in the antibodies required to combat them, and that an autogenous vaccine will contain the exact variety of the germ that is causing the disease and will cause to be formed the exact antibody that is needed to help the patient in overcoming it.

A serum differs from a vaccine in that it is prepared from the blood of an immune person or animal and contains an antibody rather than a substance that will cause an antibody

to be formed. Many persons in conversation confuse vaccines and sera, but this is unnecessary. A serum confers passive immunity. A vaccine is given to induce active immunity. The most widely employed vaccine is that against smallpox. The most widely used serum is diphtheria antitoxin.

Specific and non-specific immunity. To a considerable extent, and against certain germs, immunity seems to be highly specific. Immunization against diphtheria is no protection against typhoid fever. Having had whooping cough does not render us immune to smallpox or measles. A serum that protects against one variety of the pneumonia germ is useless against a second variety.

On the other hand, animals can be protected against the disease called *anthrax* by vaccination with certain kinds of bacteria not related to the anthrax germ; physicians sometimes inject milk protein to raise the immunity in certain chronic infections; vaccination with one kind of bacteria sometimes gives a partial immunity to related kinds; and it is reported that during the great influenza epidemic of 1918 tuberculosis patients suffered less than persons in good health.

One scientist has written a magazine article on "The Danger of Being Perfectly Healthy," and if by "healthy" we mean free from infection, there is something in his point of view. There is considerable evidence that, in part, immunity is general, and that sometimes infection with one kind of germ raises the resistance against other kinds.

Personal hygiene and immunity. Against certain diseases (e.g., smallpox, measles) we have little, if any, natural immunity, and good health is no protection against attacks of such diseases. Indeed, in preventing any of the diseases that run a quick course, good health and general personal hygiene seem quite ineffective; typhoid fever and pneumonia attack the strong as readily as they do the weak. "Without infection there is no protection" is probably true for any disease for which immunity must be acquired.

On the other hand, in overcoming germs after they have started to grow in the body — in developing the antibodies upon which acquired immunity depends — there is every reason to believe that personal hygiene and vigorous health play a great part. Good food, sunshine, fresh air, rest, and sleep have all been found highly important in building up the resistance in tuberculosis, and there is no reason to believe that they are not equally important in raising the immunity to other infections. Especially in infections of a chronic type, where it is possible to get the defensive forces of the body into action and hold them in action over a long period of time, hygiene can be used to raise the acquired immunity to its full height.

In subsequent chapters we shall mention some of the methods that are employed to raise the immunity against germs of different kinds.

QUESTIONS

1. What two general methods are used in preventing infectious diseases?
2. Explain the distinction between natural and acquired immunity.
3. Explain the distinction between active and passive immunity.
4. How does the body resist infection?
5. What measures are used to develop active immunity?
6. How may passive immunity be conferred?
7. Distinguish between vaccines and sera.
8. Distinguish between specific and non-specific immunity.
9. In what class of infections is personal hygiene especially effective?

CHAPTER TWENTY

COMMUNICABLE DISEASES

FOR a long time a distinction was made between contagious and infectious diseases. It was supposed that a contagious disease was communicated by direct contact, while an infectious disease was "in the air" and might be contracted without touching any person or article contaminated by an ill person. The terms are no longer used with these meanings, because diseases cannot be classified in this way. Physicians prefer the word *communicable* as covering all classes of diseases in which the germs are carried from one person to another.

The germs of some diseases are transferred directly by contact, or on articles that have been about an infected person; in other cases they travel indirectly through water, food, or air; and sometimes they are communicated through the bites of insects. Before the agency of the mosquito and other insects in the spread of infection was understood, the mysterious rapidity of the spread of such a disease as yellow fever or bubonic plague naturally led to the belief that the very air was poisoned; and until it was found that certain germs are conveyed in water, it was not understood how a single case of typhoid fever might cause an epidemic in a town miles away.

Channels of infection. There are four common channels through which the germs of communicable diseases enter the body:

(1) Through the alimentary tract, as in typhoid fever, dysentery, cholera, and sometimes tuberculosis.

(2) Through the respiratory passages, as in pneumonia, tuberculosis, diphtheria, influenza, measles, and scarlet fever.

(3) By direct inoculation from the bite of an insect which introduces the germ into the blood, as in malaria and yellow fever.

(4) Through cuts and wounds, as in tetanus (lockjaw), anthrax, and infection of wounds with pus-forming bacteria.

Public control of communicable diseases. In many cities and states the attending physician is required to report cases of most communicable diseases to the board of health. On receipt of this report, there is sent to the house a representative of the health department, who inspects all the surroundings, including the patient's room. Inquiries are made into the method of disinfection employed and the effectiveness of the patient's isolation, and if the disease is considered communicable to a degree endangering the public, the house is "posted."

Thus the question of isolation for the purpose of controlling the spread of the disease is not left to the individual but is enforced by law. Nurses taking care of such cases are required to keep themselves separate from other persons. In some cities those living in the same house as a patient suffering from scarlet fever, diphtheria, or smallpox are forbidden to go into public places.

Supplementing such regulations are laws controlling food distribution and supply. The health of those who handle milk and other food is investigated, and the source of the supplies inspected. Various means are taken to keep milk and other food free from dangerous bacteria, and thus to prevent the spread of communicable diseases. Milk bottles are not allowed to be taken from a house where a communicable disease exists. The two important methods of preventing the spread of infections are to isolate the patient and to destroy by disinfection the germs that come from the patient.

Isolation. The most important measure in the control of communicable diseases is isolation, but to be effective this must be complete and must be continued until all danger that the patient will give the disease to others is past. When this time comes the patient should be bathed with a disinfectant, have the hair washed, and be provided with clean clothing before leaving the room. A diphtheria patient should be kept iso-

lated until the cultures from the throat are negative. The period of isolation is prescribed by the physician in charge and by the board of health. A patient should not be allowed to come out of the room or mingle with the family until permission to do so has been definitely given.

Many persons are careless about traveling during convalescence. One should be sure, before entering trains and hotels, that there is absolutely no danger of carrying a disease. In one case a child convalescing from scarlet fever was taken in a Pullman car to a summer resort. Extreme illness and even death resulted from the infection spread among the passengers, and the summer resort eventually had to be closed early in the season, to the serious financial loss of those depending on it for their income.

Disinfectants. Fire, hot water, and sunlight are three of the surest disinfectants that are usually available, but for some purposes these cannot be conveniently used and chemical disinfectants are employed. Some of these are better for one purpose and some for another. The following list includes those most commonly used in bedside disinfection :

Bichlorid of mercury, a common and easily obtained disinfectant, should not be used for disinfecting animal excreta ; that is, it is not suitable for use in cases of typhoid fever or other diseases where the bowel discharges are to be disinfected, and it is not as good as some other disinfectants for use on the sputum of a consumptive. It is injurious to toilet bowls and pipes, and stains white clothing. It must not be used in a metal vessel. If used constantly, it may be injurious to the skin. It is useful for disinfecting glass, washing paint, or cleaning enameled ware.

Carbolic acid is the best general disinfectant to use in an infectious case. The proportion should be one part of the acid to thirty-nine parts of water. It should be made up with hot water and thoroughly dissolved in the water. It neither stains the clothes nor injures piping. The objections to it are that

care must be taken in its preparation, as, if not thoroughly mixed, it may burn the skin; that if used too strong it may cause a feeling of numbness or produce sores; and that many persons object to its odor.

Disinfectants such as *cresol*, *lysol*, *creolin*, and other coal-tar derivatives are good, but may be more expensive than carbolic acid.

Formalin is a solution of formaldehyde gas in water. It is non-poisonous and does not injure silk or wool, but it gives off a gas which is very irritating to the mucous membrane, and to which some persons are especially sensitive. It must be very carefully used, particularly in diseases where the throat and nose are affected.

Binioidid of mercury is twice as strong as bichlorid of mercury and is therefore used at half the strength. It can be used with metals and does not injure the hands.

Alcohol can be used as a quick disinfectant for the hands, but if used too often it will dry the cuticle and may cause fissures in the skin.

It is always to be remembered that the germs of all ordinary diseases are killed practically at once by boiling water, and that where they are not protected by something over them, strong sunlight is almost instantly fatal to them. Clothing can often be disinfected by boiling, more easily than in any other way, and chairs and other articles of furniture can be made safe by placing them in the sun. It should be remembered, however, that light which has passed through ordinary window glass has lost its disinfecting power.

Disinfecting the room. As gas disinfection is no longer considered necessary, the method used for the disinfection of a room is to clean it thoroughly and leave it open to sunshine and fresh air for several days. The floors may be washed with a disinfecting solution, and if possible the walls too may be cleaned in this way. If the walls are painted, a fresh coat of paint may be put on. If care has been taken to destroy

sputum and other infectious material from day to day, the room will in most cases be practically free from infection as soon as the patient is well, and nothing further is necessary. Disinfection of a room after the patient has been removed from it is spoken of as *terminal disinfection*, as contrasted with the *bedside disinfection* that is carried out through the course of the disease.

Contacts, missed cases, and healthy carriers of disease germs. When a disease such as diphtheria, measles, or scarlet fever occurs in a school, all children who have come in contact with the child who is taken ill should be thoroughly examined by a physician. If germs are found or if there is an indication of cold or sickness of any kind, the child should be kept from school until well. In highly communicable diseases like measles, an exposed child should be isolated even before the symptoms appear; for it is practically certain that the disease will develop and in many diseases the patient becomes infectious before he himself is ill. To control certain diseases, contacts as well as those actually ill must be isolated.

Another problem in the control of communicable diseases is that of unrecognized cases of these diseases and of healthy carriers of virulent germs. It sometimes happens that an infectious disease takes a form so mild that a physician is not called, and the nature of the disease is not discovered. In such a case, of course, nothing is done to prevent the spread of the germs, and a person exposed to contagion by a mild case may have the disease in a virulent form.

Disease germs may also be spread through "carriers," persons who may either have had the disease themselves or may have been in close contact with someone who had it. After convalescence from some diseases the germs may remain in the body for months or years, and while the carrier may seem to have recovered he may still give the disease to those who come in contact with him. In some persons the germs are so persistent that they cannot be destroyed by treatment. This is

especially true of carriers of typhoid fever. Such persons should not be allowed to cook or distribute food to others, and should be strictly clean in all their habits, particularly in washing and disinfecting their hands after going to the toilet.

Still another class of carriers is found among healthy persons who have been in contact with those sick from certain infectious diseases. A considerable number of those who are in contact with diseases like diphtheria, meningitis, pneumonia, and poliomyelitis (infantile paralysis) carry the germs in their noses and throats, although they themselves show no indication of the disease. These carriers are the chief problem in the control of certain infections, and if the disease is to be kept from spreading, such carriers must be isolated until they are free from the germs. It is, therefore, necessary to give attention to other persons besides those who are actually ill if we wish to hold communicable diseases in check.

Avoiding unnecessary exposure to disease. No one should be exposed to a communicable disease unnecessarily. It is not to be assumed that because the person suffering from the disease has it in a mild form, or because the person exposed is in excellent physical condition, the disease will be transmitted in a mild form. If enough germs are taken into the body to result in the disease, it may take a virulent form, and previous good health may not prevent serious complications and even death. If called upon to care for a person ill with a communicable disease, a nurse should undertake it with courage and confidence and take all means to prevent contagion. But no one should unnecessarily court infection, because even if the disease is not contracted by the person exposed, the germs may be carried to others on the clothing or the hands. The fewer the number of persons exposed to a disease, the smaller the number of germ carriers and new cases there will be.

Chemotherapy. Of great importance in both the prevention and treatment of infectious diseases is chemotherapy — the use of chemical substances that either kill the germs within

the body or stimulate the body's natural defenses until the germs are overcome. Quinine has long been used against malaria, and mercury and arsenic compounds are employed in the treatment of syphilis. The discovery of a new drug, sulfanilamide, marks one of the greatest advances ever made in the chemotherapy field.

The usual cause of tonsillitis, appendicitis, puerperal (childbirth) fever, and many other diseases is a germ called *streptococcus*. There are many varieties of this germ, and against some of the most important of these sulfanilamide is effective. Moreover, modifications of sulfanilamide and also other compounds recently discovered are proving most useful in the treatment of other diseases (page 253). These compounds can be used both to prevent and to cure infections, but under certain conditions they are dangerous, and they should be used only under a physician's direction.

QUESTIONS

1. By what means are communicable diseases transferred from one person to another?
2. Name four ways by which infections reach the body, with examples of diseases transmitted in each way.
3. What is meant by the isolation of a case of communicable disease?
4. What are the three surest means of destroying materials that may carry contagion?
5. Name four disinfecting solutions that are commonly used in bedside disinfection.
6. Give reasons why the following disinfectants cannot be used in all cases: bichlorid of mercury; formalin; carbolic acid; alcohol.
7. How should a room be disinfected after it has been occupied by a patient ill with a communicable disease?
8. How can furniture be disinfected?
9. Define the following expressions used in speaking of the spread of disease: contacts; missed cases; carriers.

CHAPTER TWENTY-ONE

SOME ACUTE COMMUNICABLE DISEASES

THE object of this chapter is not to prescribe the treatment for various communicable diseases, enabling readers to care for their sick without the attendance of a physician, but rather to make clear the importance of calling a physician in such cases, and following his directions ; and also to explain the reasons for these directions in such a way that they can be intelligently followed. It is far easier to avoid an evil if we understand its causes, the possibility of its occurrence, and the methods to be employed in its avoidance. For these reasons I am including a brief description of each disease discussed, the treatment usually employed, and the complications which may arise during its course. In some cases, especially in so-called children's diseases, what seems to be a trifling matter may have very serious consequences.

Measles. Measles is a much more serious disease than most persons consider it to be. Not only is it often followed by serious complications, but the percentage of deaths from this disease, particularly among children under six years of age, is quite large. Therefore the patient should be carefully watched and guarded against complications. Ear troubles, enlarged tonsils and adenoids, bronchitis and pneumonia, Bright's disease, occasionally heart trouble, arthritis (inflammation of the joints), paralysis, meningitis, dysentery, and brain abscesses are all complications of measles. The eyes are affected greatly. They should be guarded from the light during the course of the disease, and all reading should be forbidden until convalescence is well advanced. Tuberculosis also may follow measles ; and because of the weakening effect that measles has upon the respiratory organs, the patient should be watched carefully for some months after he is apparently well.

Measles is communicable during the whole course of an attack, and is acutely so in the early stages before the disease is generally recognized. The germs are found in the secretions of the mouth, throat, and eyes. The patient should be kept in bed, the room should be well ventilated and cool, and great care should be taken to guard against exposure and chilling.

The incubation period of measles is about eight or nine days. The first symptoms resemble a cold, and the rash appears about four days later. Practically everyone who has not had the disease contracts it on exposure, and, to prevent the spread of the infection, it is necessary to isolate the person who is developing the disease, even before the first appearance of symptoms.

Convalescent serum is now being used by physicians in measles with good effect, both in lightening the attack and for preventing an attack by producing a temporary immunity when the disease is prevalent. It has been found that an injection of the serum given to a child within five days after exposure will usually prevent the development of the disease; and if the attack does develop, it is very mild and without complications. If the serum is given later than the fifth day after exposure and before the appearance of symptoms, the attack is not prevented but it is diminished in severity.

The serum gives an immunity that lasts for only two weeks or a month, but it can be used with good effect in preventing the spread of measles among those who have been exposed to infection, and with it the danger of the disease to infants and weakly children can in large part be removed.

German measles. German measles resembles both measles and scarlet fever. The rash is like that of measles, and the throat symptoms are like those of scarlet fever. It is a mild but highly communicable disease. There are seldom complications if ordinary care is taken.

Mumps. At first mumps may be mistaken for influenza. Early symptoms are usually fever and headache. The first

symptom may be a sharp pain in the jaw when something sour is eaten. In mumps, the gland in front of and below the ear (the parotid gland) is swollen, and when the pain and swelling both appear there can be no further doubt of the diagnosis. The incubation period is from two to three weeks. The patient is considered dangerous to others for about four weeks from the enlargement of the glands.

The patient should be kept in bed until the temperature is normal. Hot and cold compresses may be applied to the swelling, and cold baths given to decrease the fever. Children are not very ill, as a rule, but with adults the disease is often more serious. In either case, care should be taken to prevent complications.

Whooping cough. In cases of whooping cough in young infants it is necessary to guard against choking. During a severe paroxysm of coughing a direct current of fresh air in the face will often give relief. Children suffering from this disease should be kept out of doors except in damp weather, and should be kept absolutely away from other children. The clothes should be changed frequently and special attention given to cleanliness, as the matter coughed up or vomited is full of the germs. Whenever possible in such diseases, the infectious matter should be deposited on cloths that can be burned, or in pans. Bathing should be done carefully, and the child should be kept out of drafts and not allowed to become fatigued. Pneumonia sometimes comes on during an attack of this disease or during convalescence from it.

While the paroxysms of coughing are severe, it is best to keep the child in bed. If vomiting is persistent and occurs soon after food has been taken, the nourishment should be repeated after fifteen or twenty minutes. Otherwise the child may be weakened by lack of food. Water should be given freely. A close-fitting abdominal band is of great assistance to the patient. It supports the abdominal muscles during a fit of coughing and lessens the danger of hernia, which is the pro-

trusion of a loop of the intestine through a rupture in the abdominal wall beneath the skin.

Isolation should be continued for at least five weeks, or until the constant whooping has ceased. A slight cough may continue for months, and there may be a tendency to "whoop" during a coughing or crying spell. In some cases whooping cough is treated successfully by vaccination with dead germs, and in severe cases this treatment should be tried. The incubation period is usually from one to three weeks.

Some physicians use X-rays and ultra-violet rays in the treatment of whooping cough, and there is a common belief that patients benefit by sunshine and fresh air. A child with this disease should, therefore, when the weather permits, spend a part of his time outdoors.

Scarlet fever. The germ of scarlet fever is a form of streptococcus. It is a close relative of the germ that is the most common cause of tonsillitis and sore throat, and in cases of scarlet fever the throat is often severely infected. The germ produces a toxin, and it is the effect of the toxin and not directly of the germ itself that causes the rash.

In scarlet fever any discharge from the ears, seeming deafness, or complaint of pain in the ears should be reported at once to the physician. In this and other severe infectious diseases the patient should be guarded against sudden movements, as sitting or standing up suddenly, because the heart is much weakened and heart failure is possible. The urine should be measured and its quantity and character reported to the physician, as any complication affecting the kidneys may result in Bright's disease. This care should continue until well into convalescence. Nervousness and chorea are also complications to guard against in children suffering from scarlet fever.

A child who has scarlet fever should be carefully protected against a sudden chill, and kept in bed in a cool, airy room. The bowels should move regularly, and the patient should be kept on a liquid diet and encouraged to drink water freely.

Cool sponge baths may be given when the fever is high or when there is delirium.

The patient is infectious as long as discharges from the ears, nose, or throat continue.

An antitoxin for scarlet fever has been developed, and if this is administered early in the attack, the majority of cases are cured more quickly and the danger of complications is decreased. If the antitoxin is given later in the attack, there is little benefit. A convalescent serum that has even greater effect than the antitoxin has also been prepared. The convalescent serum should be secured from the third to the sixth or seventh week after the attack, as later than this its potency diminishes.

The germ of scarlet fever is evidently widespread, and many persons have light infections and develop immunity to it without having a regular attack of the disease. By a skin test (the "Dick Test") it can be determined whether or not a person possesses this immunity. In this test a small amount of scarlet-fever toxin is injected into the skin. If the person is immune there is no reaction, but if he is not immune a reddened area will appear around the wound. This redness, if it is to be interpreted as showing a lack of immunity, should appear in about twenty-four hours and last for several hours.

One who is susceptible and has been exposed to the disease can be made immune by repeated doses of antitoxin. Immunization is particularly valuable during an epidemic of scarlet fever, but it lasts for only a few weeks.

Diphtheria. Complications of diphtheria are heart failure, infection in the mastoid sinus, albumin in the urine, paralysis in various parts of the body, and acute diarrhea. Diphtheria nowadays is not the dreaded epidemic disease of twenty or thirty years ago. With the use of antitoxin the after effects are far less serious than formerly, and the death rate among those attacked has fallen from 45 per cent to 10 per cent.

IMPORTANT FACTS IN REGARD TO

DISEASE	INCUBATION PERIOD	EARLY SYMPTOMS	RASH APPEARS	CHARACTER OF RASH
<i>Typhoid fever</i> . .	Usual: about 2 weeks. Extreme: 5 to 23 days	Headache; pain in limbs; excessive fatigue; nosebleed	7th to 10th day	Red elevated; disappears under pressure. Usually found on abdomen
<i>Measles</i>	8 to 12 days	Fever; catarrhal symptoms; glands in neck enlarged	3d to 5th day	Small red spots like fleabites. First on forehead, face, back of neck, and other uncovered parts
<i>German measles or rubella</i> . . .	Usual: about 2 weeks. Extreme: 10 to 24 days	General constitutional; appearance of cold; glands in neck enlarged; sore throat with same appearance as in scarlet fever	1st to 3d day	Resembles either measles or scarlet fever
<i>Chicken pox</i> . .	4 to 14 days	Mild constitutional	2d day	Small red vesicles on uncovered parts of the body
<i>Smallpox</i>	Usual: 12 to 14 days. Extreme: few hours to 3 weeks	Rather severe constitutional; fever; chills; general pain; headache; vomiting	3d day	First on forehead, face, wrists, and palms of hands
<i>Scarlet fever</i> . .	Usual: 2 to 4 days. Extreme: few hours to 3 weeks	General constitutional; apparent cold; sore throat	2d day	Bright red pin point, first on chest and upper extremity
<i>Mumps</i>	14 to 25 days	Fever; headache; pain in jaw	No rash	

CERTAIN COMMUNICABLE DISEASES

RASH FADES	DURATION OF DISEASE	DANGEROUS TO OTHERS	IMMUNITY	MEANS OF TRANSMISSION
2d or 3d day. Successive crops to 3d week	14 to 34 days	8 weeks from first symptoms. May become permanent germ carrier	2d attack known to occur	Discharges from the intestines, urine, or articles soiled with discharges. From contaminated water or milk
7th day	3 weeks	3 weeks from rash, if cough has ceased	Usually. Occasional 2d attack	Secretions from mouth or nose, or from articles freshly soiled with secretions
7th day	3 weeks	3 weeks from eruption	Yes	Same as measles
Comes and goes. First crop followed by others	6 to 7 days	Until scales are gone	Yes	Secretions from mouth or articles soiled with secretion. Direct contact with skin
9th day scales fall	14 to 21 days	Until scales are gone	2d attack known	Articles soiled by secretions. Contact with skin, secretions from nose or throat, or any secretion
3d to 7th day	3 to 8 weeks	Average time about 6 weeks from appearance of rash. Infectious until eyes, ears, and throat are healed	2d attack rare	Secretions from nose and throat or from articles freshly soiled
	4 weeks	4 to 5 weeks	Yes	Secretions from mouth and nose

IMPORTANT FACTS IN REGARD TO

DISEASE	INCUBATION PERIOD	EARLY SYMPTOMS	RASH APPEARS	CHARACTER OF RASH
<i>Diphtheria</i> . . .	1 to 7 days	Apparent cold; acute inflammation of throat and nose; white patches on throat	No rash	
<i>Whooping cough</i> .	2 to 14 days	Fever; inflammation of respiratory tract; slight cough	No rash	
<i>Influenza</i> . . . (See page 219.)	1 to 14 days	Like severe cold with fever, chills, and general prostration	No rash	
<i>Poliomyelitis or infantile paralysis</i> (See page 257.)	Unknown	Irregular; sometimes fever and cold; always pain and stiffness in neck; frequently pain in muscles over body generally, particularly if touched	No rash	

Antitoxin itself in all ordinary cases does practically no harm to the patient. Sometimes a little rash will appear on the body, near the point where the serum is injected, or temporary pain in the joints may follow its use; but these disadvantages are trifling in comparison with the beneficial effects of the serum. Diphtheria antitoxin, as well as other serums and vaccines, is manufactured under government control, and each lot is thoroughly tested before being used on human beings. All serums should be carefully administered to prevent infection from other sources, and given, of course, by a physician who understands their use. The size of the dose depends upon

CERTAIN COMMUNICABLE DISEASES (*Continued*)

RASH FADES	DURATION OF DISEASE	DANGEROUS TO OTHERS	IMMUNITY	MEANS OF TRANSMISSION
	Irregular; affected by treatment	Until test shows no germ in throat	Yes	Secretions from mouth and nose
	Acute for 5 weeks or more	At least for 5 weeks	Yes	Throat and bronchial secretions
	Irregular	Until secretions stop	Possibly of short duration	Discharges from throat and bronchial tubes
		At least 3 weeks	Yes	Discharges from mouth, nose, and intestine

the seriousness of the disease. Large doses can be given without injury. The first dose of antitoxin given in an ordinary case of the disease is usually 6000 units, and this is repeated as often as necessary. In a serious case as much as 16,000 units is given at once, and as much as 100,000 units during the day is sometimes given to a child.

Antitoxin should, if needed, be given to the nurse also and to others who have come into close contact with the patient, as it will prevent the development of the disease in them. The diphtheria antitoxin does not, like the vaccine of smallpox, give immunity for years against the disease, but affords temporary

help to the body by neutralizing the toxin produced by the germs.

Diphtheria is one of the diseases frequently spread by healthy carriers. These may be persons who, after recovering from the disease, still have active germs in their throat and nose; or they may be those who, having come in contact with someone having diphtheria, do not themselves develop the disease but yet are carriers of virulent germs. When a case of diphtheria is found in a school or home, cultures should be made from the throats of all who have come in contact with the patient, and all carriers of the germs should be isolated until the danger of conveying the disease is over. Sores in the skin may be caused by the diphtheria bacillus, and germs may be spread from these sores as well as from the throat. Usually the incubation period is from one to three days, but it may be from a few hours to ten days or even more. The patient should be kept in quarantine until cultures show that the throat is free from germs.

Many persons develop immunity to diphtheria without becoming ill from the disease, and, as in scarlet fever, a skin test can be used to determine whether immunity exists. In this test (the "Schick Test") a small quantity of diphtheria toxin is injected between the layers of the skin. If the person is immune, there is no reaction. If immunity is lacking, a localized swelling and redness will appear in from twenty-four to forty-eight hours. This swelling may last from seven to ten days, and when it disappears the skin will peel off where the redness has been. If there is a positive reaction and the person has been exposed to diphtheria, so that quick immunity is desired, repeated doses of antitoxin are given as in scarlet fever.

A more durable immunity can be developed by the use of a modified toxin called "atoxin" or "toxoid," or of a mixture of toxin and antitoxin. By this method an active immunity can be built which lasts for at least six years and possibly much longer. Vaccination with a toxin or with toxin-antitoxin is

by far the most effective way we now have for controlling diphtheria, and in many places each child is thus treated and his immunity to diphtheria established before he enters school.

One of the sudden complications of diphtheria is failure of the heart. The toxin spreading throughout the body during the attack softens and injures the heart muscles, and it is highly important that no unnecessary strains be put upon the heart. The patient should rest quietly in bed during the attack, and when convalescent he should follow in exact detail the physician's orders as to exercise.

Another complication which sometimes follows a severe attack of diphtheria is paralysis or possibly a pseudo-paralysis. This may appear in only a part of the body, arms, or legs, or may involve almost the whole body. This condition is curable, and should be treated as soon as the necessity for rest has passed. The treatment should consist of massage and carefully given exercises, and the patient should be guarded against over-use of the muscles until their power is restored.

Chicken pox. Chicken pox is highly infectious. The first symptoms are usually a chill, vomiting, and pain in the back. The rash in its early stages does not resemble that of smallpox, but at a later stage of the disease has much the same appearance as that of the early stages of smallpox. As a rule the disease is mild in children, but may sometimes be quite severe in adults. There are seldom complications, although cases of nephritis (inflammation of the kidneys) and paralysis have been reported. Unless the pustules are rubbed or scratched or unless they are unusually large, there are no scars.

Smallpox. Smallpox patients are almost always removed to a hospital, so that this disease is very rarely nursed in the home. It is an acute fever, highly infectious. The first symptoms are intense headache, pain in the back and limbs, and vomiting. When the rash first appears it resembles that of scarlet fever, but in four days it changes to the characteristic rash with the peculiar odor of smallpox.

The treatment is that given to most fever patients, and the patient is kept in bed, on a liquid diet, with cool baths, the affected parts covered with lint wet in an ice-cold, mild disinfectant solution. When crusts form over the rash, they are softened with vaselin. Care should be taken to prevent rubbing or scratching of the scabs, as this increases the danger of scars. The eyes must be washed with boric acid solution.

Vaccination. Smallpox is not now the virulent disease it used to be. Most cases are mild, and the percentage of deaths is low. Before vaccination was discovered, about 95 per cent of the population suffered from smallpox and at least 35 per cent of those attacked died of the disease.

The germs of smallpox are long-lived, and have been known to exist for months in clothing, books, letters, and other things. They are carried by flies, and may be borne in the air for a short distance. The fact that one is in good physical health does not protect against the germ of smallpox. There are only two ways to become immune: one is to have the disease, even in a mild form; the other is to be vaccinated. Those who have been vaccinated either do not contract the disease or have mild attacks. The only deaths that occur from smallpox are, practically without exception, among those who have not been vaccinated at all, or not for many years. During an epidemic in Philadelphia in 1903-1904, not one person who took the disease had been vaccinated within five years. In England, in one county where vaccination was not practiced, the epidemic continued for months in spite of all means of disinfecting and medical treatment, and was not stamped out until vaccination was used. Concerning an epidemic in Puerto Rico in 1916, similar facts are recorded, vaccination not having been enforced there because of lack of funds. At least 4000 children in the schools of San Juan had been vaccinated, and not one case occurred among them; but more than 500 cases occurred among the adults in San Juan and the surrounding country. Upon the appearance of the disease, money was appropriated

by the government, vaccination was made compulsory, and vaccinators were appointed. Those suffering from the disease were taken to hospitals, their homes were disinfected, and the disease was soon stamped out. At first, through accident or intention, some persons were not at home at the time of the visits of the doctors, and the severe cases and deaths which occurred were practically all among these persons.

Vaccination will give immunity, ordinarily, for from five to nine years. The exact period varies with the individual. A safe rule to follow is that of being vaccinated once in seven years, or oftener if there is an epidemic or if one has been exposed to the disease.

QUESTIONS

1. When is measles communicable?
2. Mention some complication of measles that must be guarded against.
3. How does German measles differ from other measles?
4. At what age is mumps considered more serious?
5. Where in the body are the germs found during attacks of the following diseases: measles, whooping cough, scarlet fever, diphtheria, and smallpox?
6. What is the Dick test, and what does it show?
7. How can a temporary immunity against scarlet fever be established?
8. What is the Schick test, and what does it show?
9. How can a person be permanently immunized against diphtheria?
10. What proof is there that vaccination against smallpox is of value?

CHAPTER TWENTY-TWO

COLDS AND INFLUENZA

COLDS

THERE are few subjects upon which it is more difficult to advise than that of preventing colds, because our knowledge of this subject is inadequate and incomplete. Colds are generally looked upon as being caused by germs, but the particular germ or germs responsible have not been identified.

One reason for regarding colds as germ infections is that they often run in epidemics. Moreover, persons who have been camping out, sleeping in the open air, and living outdoors all day contract colds upon returning to indoor life, particularly if they are then brought into close contact with other persons. This fact would indicate that a cold is not due to exposure to cold air, but to germs that are passed from one person to another. It is also a well-known fact that colds are prevalent among those who keep their windows closed and avoid fresh air, even when these persons are warmly clothed.

The germs of cold. According to the best-informed scientific and medical opinion, an epidemic cold probably consists of two stages. The first or acute stage is due to some germ (probably a filterable virus) not yet isolated, which sweeps through a community and is the primary cause of the epidemic. The second stage is due to one or more of a number of germs that are often found in the nose and throat and which attack the mucous membranes as "secondary invaders" after these parts have been weakened by the primary invader. Epidemic colds are about equally common in all parts of our country, but colds are much less likely to hang on and become chronic in the warmer and drier regions.

Chronic colds, bronchitis, and catarrh are probably due to a number of different germs that have succeeded in establishing for themselves in the mucous membranes a more or less per-

manent home. In some cases the colds seem to be due to sensitization to pollen or dust that is being inhaled (Chapter 15).

Prevention of colds. The conclusions that we can reach in regard to colds are: (1) that colds are infectious, some more, some less, and (2) that by raising the resisting powers of the body, one may in some cases avoid attacks of colds and in other cases make them less prolonged and less severe. Efforts toward avoiding these ailments must, therefore, be directed toward keeping the germs from entering the body or toward building up the defenses of the body until it will be able to resist the germs.

The germs of colds may be breathed in from droplets sneezed or coughed into the air in schoolrooms, elevators, crowded buildings, and street cars. They are found on public cups, dishes, towels, pencils, and other articles handled by infected persons, and from them they may be transferred directly to the hands. For this reason public towels or cups should never be used, pencils or coins should not be put into the mouth, the hands should not be brought to the face and mouth, nor should any food be touched without washing the hands. Unsterilized dishes in public eating places and glasses in soda fountains have been found to be very important in spreading the germs of all respiratory diseases. Only those places that are conducted according to strict sanitary standards should be patronized.

For the average person it is probable that the only sure protection against epidemic colds is the avoidance of the germ, just as the avoidance of the germs of measles and certain other acute infections is the only safeguard against these diseases. Against chronic colds and the prolonged secondary stages of an acute cold, a healthy condition of the body and perhaps vaccination are the best defenses. Nose douches and throat washes afford no protection against either acute or chronic colds, and experiments with animals indicate that most of them lower the resistance of the mucous membranes and make easier the growth of the germs.

To build up resistance to germs of chronic colds, the body should be put into a condition of health. Low resistance may be caused by indigestion, constipation, over-fatigue, lack of fresh air, want of sleep, want of proper food, or in fact by anything which lowers the general vitality. The sudden chilling of the body by going out into the cold or standing or sitting in a current of air without sufficient protection may also tend to lower the resistance to germs. Getting the feet wet and keeping on wet shoes, or sitting in damp clothes, has a similar effect. Sometimes dust will cause an irritation of the mucous membrane, permitting the development of the germs. One cold often leads to another because of the lowered resistance following the first attack, and because the semi-inflamed mucous membrane makes a more inviting soil for the growth of the germs.

A person subject to colds should try in every way to put the body into that condition of strength and good health which will enable it to resist the disease. Diet should be carefully considered, and should include a variety of foods, but nothing not easily digested. The bowels should be kept moving regularly. Exercise in the fresh air and a proper amount of sleep are also important. Sleeping out of doors is one of the popular preventives of colds; both the abundance of fresh air and the hardening of the body are helpful. It should not be done first in winter, but the practice should be begun in summer and continued through the cold weather. The bedclothing should be warm, and one should not continue outdoor sleeping if unable to keep warm. Cold baths, taken properly, are of benefit; salt rubs stimulate the skin and give tone to the nervous system; a cold shower may be beneficial.

Vaccination against the germ of acute, epidemic colds is not yet possible, but many physicians advise those of their patients who are subject to chronic and prolonged colds to be vaccinated against them each autumn before the cold season opens. This does not prevent the acute part of the cold that is due to

the unknown germ, but in at least half the persons treated the resistance to the secondary invaders seems definitely to be raised. The attacks then do not run on into chronic colds, and there is much less danger of their going on into bronchitis, mastoiditis, pleurisy, pneumonia, asthma, or other illness. It is believed that vaccination carried out before the cold is contracted is for many persons a safeguard against these troubles.

Treating a cold. Upon feeling the first symptoms of a cold, such as chilliness, fever, headache, or sore throat, one had best go to bed; also the bowels should be cleared out thoroughly. A simple remedy which is frequently efficacious is sodium bicarbonate (cooking soda) — three doses of from one-half to one teaspoonful in a full glass of water given at intervals of an hour. This counteracts the acidity which is frequently present with a cold, and will sometimes be all that is necessary to clear the bowels. A hot bath will help to draw the blood away from congested parts and equalize the body temperature. Hot lemonade, taken after the bath, may also be beneficial. The body, especially the feet, should be kept warm, water should be taken in abundance, and only the most easily digestible food should be eaten.

Many medicines for curing colds are sold, but no medicine should be taken unless recommended by a physician, since many of the patent remedies recommended for colds contain injurious drugs. Steam inhalations are useful for clearing out the nostrils, but should not be taken immediately before going outdoors or before opening the windows at night during cold weather. There are several types of apparatus sold for use in taking steam inhalations, but a



FIG. 54. A funnel for steam inhalations made by rolling a towel and a paper together.

satisfactory substitute can be made with a pitcher and a newspaper or towel folded into funnel shape. The boiling water and medicine are put into the pitcher, and one end of the funnel is placed over the pitcher and the other over the mouth and nose. A solution which is often used for a steam inhalation is made of tincture of benzoin, one teaspoonful to one pint of water.

Blowing the nose irritating to the mucous membrane. The membrane within the nose and the skin outside are irritated by constant use of the handkerchief in blowing the nose. This can be avoided by the use of oil or vaselin, which also helps to keep the nose clear during the night, and is particularly good in the case of infants and young children. Liquid vaselin may be used, and with children may be injected gently into the nostril with a medicine dropper. A wooden toothpick or match upon which a pledget of absorbent cotton has been twisted, may be used to insert vaselin.

When blowing the nose during a cold or after the use of a spray, the sides of the nose should not be compressed with the fingers, but the handkerchief should be held in front of the nostril, and with the mouth slightly open the nose should be blown free. Blowing the nose violently while one side is closed may force air and germs into the Eustachian tube and into the sinuses of the bones of the face, and may start inflammation in those parts (page 31).

Treatment of chronic colds. Colds in the head should not be allowed to continue until chronic. With chronic colds, the membranous lining of the nose and the thin bones within it may become thickened, or the infection may spread into the various sinuses and cause inflammation lasting for weeks and months. When pus forms in the sinuses, there is frequently pain and headache. There is also a steady discharge from the nose and sometimes into the throat, and at times this causes the breath to have an offensive odor.

In many chronic colds the seat of the trouble is some focus of

infection in the tonsils or in some of the sinuses in the head ; or the difficulty may be that enlarged or bent bones interfere with the proper drainage of the nose (pages 33-34). In any case a specialist should be consulted and treatments be given, or if necessary, an operation performed. As has been noted above, some (not all) persons with chronic colds are benefited by vaccination. The possibility that a chronically inflamed condition of the nasal mucous membranes is due to substances that are being inhaled should not be overlooked ; and if this is found to be the case, appropriate treatment should be given (Chapter 15).

INFLUENZA

Beginning in the latter part of 1918 and continuing through the next year, there raged an epidemic of influenza which caused as great mortality as any epidemic the world has ever known. Coming as it did during the World War, it was the largest single cause of death to the millions of soldiers massed together ; but the epidemic was not confined to the armies in the field or to one country or continent. Beginning in the Far East, the disease passed over northern Europe, spread south and east until it had reached the farthest limits of Asia and Africa, leaped the ocean to the Americas, and reached far into the South Seas to Australia and New Zealand. In the great centers of population, as high as 40 per cent of the total population were stricken, and the number of deaths ran far beyond anything that had been known in other epidemics in modern times.

Although since then no such widespread and deadly an influenza epidemic has occurred, there have been many lesser epidemics, and more deaths result from this disease than is commonly realized. This is not so much because doctors do not understand the correct treatment, but because of the difficulty which they have in getting full coöperation from their patients. For this reason it seems desirable to introduce here a description of the disease and its treatment.

Preventive measures advisable. The exact germ which is peculiar to influenza is still not certainly identified. But that it is a communicable disease is taken for granted by all authorities, and directions for the isolation of influenza patients are included in the rules sent out by many health departments.

With this disease, as with all communicable diseases, the infection should be checked at the source by complete isolation of the patient. The early symptoms closely resemble those of a cold, and this is just one more reason why those suffering with an apparently ordinary cold should be kept away from others. Yet this rule is so difficult to enforce that one is constantly exposed to infection from almost any disease beginning with inflammation of the mucous membranes.

Therefore, during an epidemic of influenza it is well to keep away from crowds, to stay out in the fresh air and sunshine as much as possible, and to take such precautions as are taken with other communicable diseases. In nursing a case, a face mask should be worn when giving a treatment, and the patient must not be allowed to cough or sneeze in the face of the nurse. If the face mask becomes infected, it should be disinfected or destroyed.

Symptoms of influenza. The onset of influenza resembles that of a severe cold. There is acute inflammation of the mucous membrane of the throat and nose, fever accompanied by chills, and early prostration. At times there is an excessive amount of sneezing, suggesting hay fever; there may be inflammation of the eyes, with severe pain in them; there frequently occurs a congestion in the eardrums; and there is a tendency toward middle-ear inflammation. There are generally severe muscle pains, especially in the side and the back, and there may be sufficient pain in the muscles to make breathing difficult.

Although the fever is high, the skin may be moist. There is a tendency in this disease to dilatation of the blood vessels, and because of this condition there is frequently a marked increase

in the flow during the menstrual period, and profuse bleeding from the nose. The pulse is frequently slower than is natural with high fever. The heart is generally weak from the beginning of the disease, and collapse may come suddenly. The weakened condition of the heart is one of the many reasons why one should go to bed even in the early stages of influenza.

Types of the disease. There are different types of the disease — the catarrhal, the nervous, and the intestinal. Strange as it may seem, during the different epidemics the disease may universally run to one or the other of these types, or there may be a combination of them all. Intestinal influenza is quite usual and may occur without respiratory symptoms. In this type of the disease there may be profuse diarrhea, with intestinal irritation and pain. In all types of the disease there is great prostration, nervous and muscular debility, circulatory weakness, and almost always great exhaustion. All of the symptoms indicate a profound toxemia — a poisoning of the whole system by a toxin the effects of which are more lingering than are the effects of almost any other disease.

Complications. The most frequent complication of influenza is pneumonia of the lobular or bronchial type. Another complication which is quite common is infection of the middle ear and of the sinuses in the region of the nose. Indigestion is a common complication, as are also sleeplessness and mental depression. Pyelitis (inflammation of a part of the kidney), meningitis, heart failure, asthma, and empyema (pus in the pleural cavity) are sometimes developed. Resistive power against disease is reduced, and any disease present at the time of an attack of influenza is likely to be increased in severity. Infected teeth or tonsils may become active because of the general rundown condition of the body, and the troubles which are associated with these foci of infection may develop.

Treatment. Of first importance in the treatment of even a suspected case of influenza is rest in bed.

The first indication not only of influenza, but of colds and of many other communicable diseases, is inflammation of the lining of the nose and throat, with other symptoms such as sneezing, chilliness, and fever. Many doctors feel that if their patients would go to bed promptly at the earliest appearance of these symptoms, it would in many cases prevent the illness from becoming a serious one and would minimize the danger of serious complications. The strain upon the heart would be less, and the liability to develop further colds and pneumonia would be decreased.

As the heart is so often weakened in this disease, depressing drugs for reducing fever and lessening headache should not be given unless under the direction of a physician. If there is an epidemic of influenza, it is much better to call a physician at the first symptoms, rather than to wait until the body has been weakened by drugs and the disease has got a firm hold. The first rules of home treatment, then, are rest in bed and promptness in calling a physician.

As the disease frequently begins with a feeling of chilliness or a chill, hot-water bags may be put to the feet and around the body, covers may be put over the patient, and hot drinks such as tea, malted milk, milk, or hot lemonade may be given. Sodium bicarbonate in doses of half a teaspoonful to a glass of water may be safely given (page 217), but no other medicines should be administered without advice. If the throat is irritated, simple gargles of salt and soda or of Dobell's solution may be used to relieve the soreness. Not much food is needed during the first twenty-four hours, nor while the excessive fever continues, but an abundance of water should be taken. The bowels should be kept open, but no heavy cathartic taken. The room should be well aired and as much sunshine as possible admitted.

The patient should resume his activities slowly. Too often, hurrying back to duties or over-exertion in any way retards real recovery and causes continued trouble with the heart.

Most patients make the mistake of not taking an attack of influenza with sufficient seriousness. Such medication as may be needed to complete the recovery should be administered only under the direct orders of a physician, and the physician's advice as to when return to work should be followed. The treatment of pneumonia, which is frequently a complication of influenza, is described in a later chapter.

QUESTIONS

1. Why are common colds considered communicable?
2. What opinion is held as to the germs that cause colds?
3. Name some means of avoiding colds.
4. Give some methods of raising the immunity of the body against colds.
5. Give simple remedies in the treatment of colds.
6. What injurious effects may follow blowing the nose incorrectly?
7. What are some of the complications which may follow a common cold?
8. Mention some of the early symptoms of influenza.
9. Name three different types of this disease.
10. Give important points in the treatment of influenza.
11. Mention complications which frequently follow an attack of influenza.
12. What effect does influenza have upon the heart and the blood vessels?
13. What precautions should be taken during convalescence from influenza to prevent either acute or chronic heart complications?

CHAPTER TWENTY-THREE

TUBERCULOSIS AND ITS TREATMENT

FOR many generations tuberculosis has been one of the most dreaded of all diseases, and the percentage of deaths among those attacked has been great. During the past few years, however, such advancement has been made in its treatment that it would seem as if now few cases should fail of recovery if the treatment is begun in time and the physician can have the full coöperation of the patient. It is believed that this failure in coöperation on the part of the patient usually comes, not from a lack of desire to work with the physician, but from a lack of understanding of the disease itself and a failure to realize the importance of following literally the physician's directions.

Prevention of tuberculosis, particularly among children, is also important, and to insure the general application of effective preventive methods it is necessary that the public should have a clear knowledge of how the disease is communicated from one person to another and of its early symptoms. It is for these reasons, and not to encourage self-treatment without the supervision of a physician, that this chapter is presented.

Tuberculosis not inheritable. The germ of this disease was discovered by Koch in 1882. Up to that time it was believed to be an inherited disease. Children of consumptive parents were expected to develop the disease and die of it, and in many cases they did. It is now understood that any inherited tendency consists of a lower power of resistance; that tuberculosis is contracted, not by inheritance, but from exposure to the germs. On this basis the prevalence of tuberculosis among the children of tuberculous parents is accounted for as being largely due to the fact that it is a communicable disease in which the contagion was acquired in the home.

In numerous cases, also, the so-called consumptive families

were found among the poor who were compelled to live in insanitary conditions, with insufficient light, air, and food and with little time or money to spend in attempts to cure a disease which they believed incurable. The members of these families developed a sort of fatalism in thought, believing that if it were their destiny to die of consumption at the age of twenty or thirty or sooner, they would die of it. It was expected that members of such families would have the disease and would die of it, and therefore practically no fight was made to cure those who developed it.

Sources of infection. There are two types, or varieties, of the tuberculosis germ, the bovine and the human, capable of infecting the human body. Correspondingly, there are two sources of infection, cattle and human beings.

The bovine type of the germ is carried into the body by raw milk, by ice cream, or by butter. The danger from meat of diseased animals is not great, as the germs are killed in cooking. The bovine type of the germ does not often affect the lungs of human beings, but attacks rather the joints, the bones, and the nodes of the lymphatic system. Children are more susceptible to it than are adults. In many states a strict examination of dairy cattle is made, and cows proved to have the disease are destroyed.

The germs in milk can be killed by pasteurization, and in most cities the health authorities require the pasteurization of all milk except a small amount of "certified" milk that is produced under special conditions and from herds that are known to be tuberculosis free.

A person having an open case of the disease is a source of infection, and he should take every possible precaution to keep from communicating the disease to others. Before the possibilities of recovery through treatment in the early stages were realized, the members of the family and the physician were often unwilling to tell the patient that he was tuberculous, for fear of the mental effect; so the patient, taking no pre-

cautions, spread the germs to everyone with whom he came in contact. Now, in most states, the law requires a report of such cases, and it is not only a violation of the law but unfair to the patient to fail to make this report ; for the sooner the patient is told of his condition and begins to carry out his treatment, the better chance there is of his recovery. Most persons, if told the truth in regard to the importance of protecting others, are quite willing to take the necessary precautions.

As the germs are contained in the sputum, this should be received either in vessels containing a disinfectant or in paper cups or bags that can be burned immediately. A consumptive should not kiss anyone, should sleep alone, should make sure that his dishes are disinfected before being used by others, should not expectorate in the street or street cars, or in a pocket handkerchief, and should not put coins, or anything likely to be used by others, in his mouth.

In open air and sunshine tuberculosis germs quickly die, but in damp, dark places they will live for weeks and months. So the house should be thoroughly aired daily, and as much sunshine let in as possible. Before moving into a house or an apartment, one should make sure that no one living there has recently had the disease. In any case, the walls and floors should be thoroughly cleansed. If a consumptive is known to have lived in the house, it should be disinfected, repapered, and repainted throughout.

Forms of tuberculosis. The part of the body most commonly attacked by tuberculosis differs with the age of the patient. Abdominal tuberculosis and meningeal tuberculosis (tuberculosis of the membranes about the brain) are responsible for about 90 per cent of the fatal cases among children under one year of age and for 75 per cent of the cases between the ages of one and five years. From two to three years of age the germ affects the glands of the neck and chest, the bones and joints, and the skin, eyes, and abdominal organs, and sometimes they cause tubercular abscesses.

Later in life, the pulmonary or lung tuberculosis is the common form. It occurs in children also, but usually as part of a general infection of the body that runs a quick course. But both acute and chronic cases occur in both children and adults, and as a rule this primary infection attacks the glands in both.

Protecting children from tuberculosis. Children are more susceptible than adults to infection with tuberculosis, and they need to be protected with especial care from the germs. As with adults, massive infection (repeated infections with large numbers of the germs) is far more dangerous than occasional lighter ones, and a child in a home where there is a tubercular member of the family is in great peril.

A tuberculous mother should not nurse her baby, nor sleep in the same room with it; she should not kiss it, nor cough near it, and she should be with the child as little as possible. The baby should be kept in a nursery or a room apart, the floor of which is kept thoroughly clean. If it is impossible to have a separate room, the baby's bed should be as far as possible from the mother's and should be kept in the air and sunshine as much as possible. If the baby must be allowed to play on the floor, a blanket or spread should be put down, the blanket marked so that the same side will be next to the floor each time. The blanket or spread should be washed frequently and kept in the sun as much as possible.

Predisposed children should not begin school too soon. It is important to establish their health and build them up before keeping them confined at school; their progress with their studies will be much more rapid if they are strong and well than if they are physically below par. Open-air schools are excellent for these children. Their diet should be watched carefully; they should be kept out of doors and not be permitted too strenuous exercise. The mouth and nose must be cared for, and if there are enlarged or diseased adenoids or tonsils, these should be taken out. Predisposed children should be

protected against all communicable diseases, particularly against whooping cough and measles.

Recently there has been developed in France a method of vaccinating young children by the use of a non-virulent strain of tuberculosis germs. This is used on very young infants that are born into families where they will be exposed to heavy infection. The method is still in the experimental stage, but it is being given a trial in this country. It is hoped that by it the immunity of the child can be raised until he is protected against the virulent germs with which, in a family where there is a case of open tuberculosis, he is sure to become infected. Reports from the use of this vaccine are very favorable.

Early symptoms of pulmonary tuberculosis. The onset of tuberculosis of the lungs is usually slow and without pain or distress. The early symptoms are loss of weight; unusual fatigue; a readiness to take cold; little appetite or perhaps indigestion; a slight cough or clearing of the throat, particularly in the morning; and sometimes expectoration. There is a slight rise of temperature toward evening; later in the disease there is a subnormal temperature in the morning, a feeling of chilliness in the afternoon, and slight sweating at night.

Many persons recover from the early stage without special treatment; but others, who take no steps to check the progress of the disease, go on into the next stage, where recovery is more difficult. If all persons who find themselves suffering with any or all of the symptoms listed above would undergo a thorough examination by a good physician, the percentage of recoveries would be greatly increased.

Methods of examining. The most common method of diagnosing tuberculosis of the lungs is to make an examination of the sputum; but the germ does not appear in the sputum in the early stage, and other methods are necessary to diagnose the disease at the time when it yields most easily to treatment.

A careful history of the patient should be taken and a

thorough examination made. Examinations by percussion, palpitation, and auscultation are useful. The tuberculin and precipitation tests are valuable, particularly as a means of distinguishing between the different forms of tuberculosis. The X-ray is one of the greatest aids in making a sure diagnosis, and all suspected cases should be X-rayed to see if there are congested spots in the lungs or infected glands along the trachea and at the roots of the large bronchial tubes. X-rays should be used in the first examination for early diagnosis, and in the latter part of the treatment to make sure that the lesions in the lungs are healed.

Treatment of tuberculosis of the lungs. The very first fact that a sufferer from tuberculosis should learn is the necessity of carrying out literally the orders of his doctor. The majority of persons who fail to get well from this disease are those who do not understand that an order concerning rest, food, or any part of the treatment must never be neglected. In one half day or less a patient can cancel the benefit which he has received from weeks of the treatment. Many physicians claim that more persons die or become chronic invalids because they fail to interpret and carry out literally the doctor's orders than from any other cause. This is certainly true with tuberculosis. The treatment may seem long and tedious, but if a person is to recover completely, he must not undertake to decide for himself just what part of the treatment he will follow, or at what stage of the disease he will discontinue his treatment and return to his usual life. The treatment consists of rest, food, fresh air, and sunshine.

Rest. By "rest" one means, unless the disease is in its early stage, complete relaxation — no unnecessary movements — throughout the twenty-four hours. In the sanatoriums where many of the acute cases are treated, the patient is fed, bathed, and waited on in every way, so that no unnecessary movement is made. He is not allowed to read, as he should not hold a book; he is not allowed to have visitors or to talk to the other

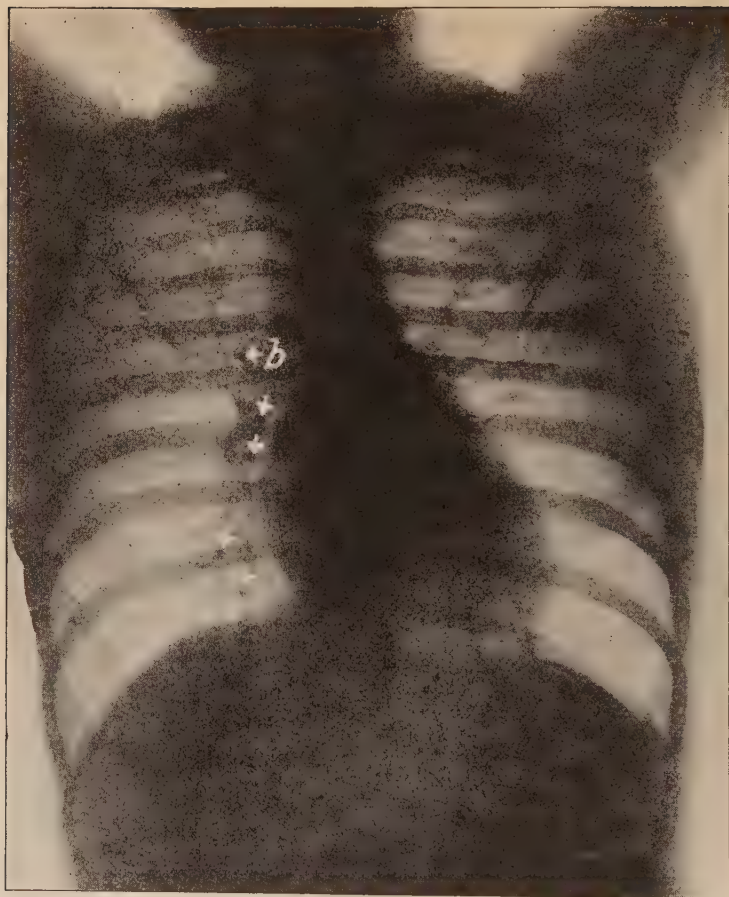
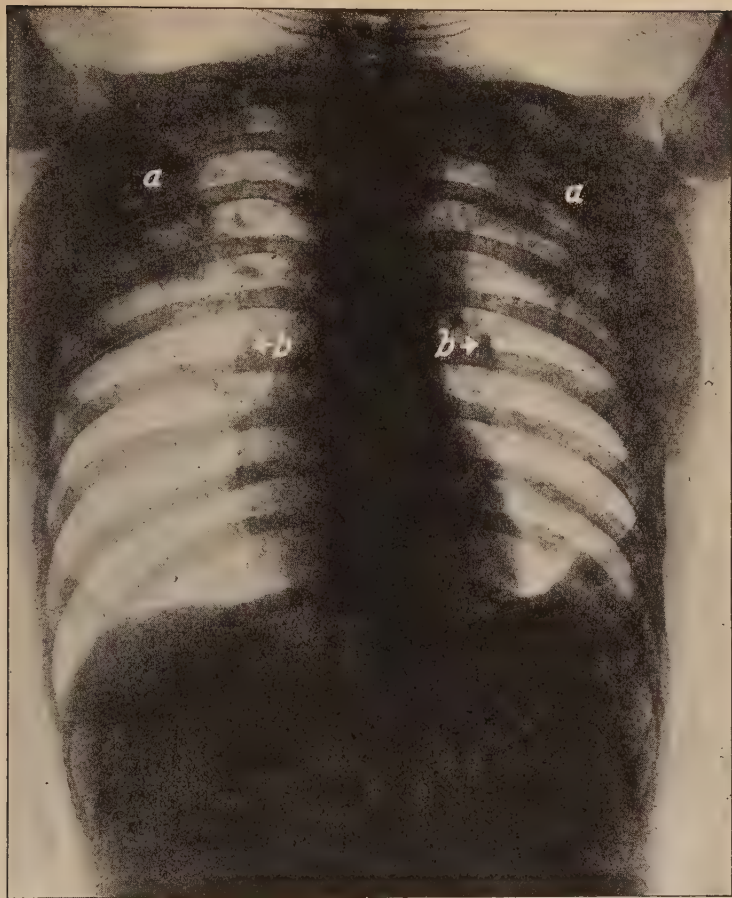
*Dr. A. P. Evans*

FIG. 55. Radiograph of the chest, showing tubercular infection of the lungs. The small dark areas are tubercles, which, because they become surrounded with calcium, cast dark shadows on the photographic plate. The dark shadow in the center of the photograph is the heart.

patients. This treatment is continued until he receives permission from his physician to change. In the early and later stages such complete relaxation is not necessary, but this is a



Dr. A. P. Evans

FIG. 56. X-ray picture of a more advanced case of tuberculosis. The dark areas (*a a*) in the upper lobes of the lungs are badly infected.

matter to be decided by the physician who has made a study of the patient and is directing his treatment.

Food. The patient is not forced to overeat, as he formerly was. He must have the best of easily digested food. Three

well-balanced meals of food which the patient likes and can digest, with a possible lunch at night, is considered best. Eggs and milk are standard foods if they agree with the patient. Soft-boiled eggs are preferred to raw, as they are more palatable and are as easily digested. Fats and meat should be included in the diet, and the digestibility of the food is important, since the digestion in a tuberculous patient is apt to be slow.

Tuberculous patients often have little appetite and sometimes crave unnatural food, but if the food is prepared carefully and served daintily, in as great variety as possible, much can be done to tempt them to eat.

It is possible to introduce eggs and cream into many dishes without the patient's being aware that the increased nourishment is there. An egg can be beaten into cream sauce or a lemonade; vegetables can be served in soup; and sometimes an egg poached in bouillon with or without a spoonful of sherry can be relished when more solid food would be refused. Custards, puddings, and salad dressings also admit of having beaten eggs added to the original receipt without essential change in the flavor. Seasoning has a good deal to do with an invalid's relish of food, and the person who cooks for invalids should make a study of the various seasonings which make a dish savory and give it an attractive appearance without interfering with its digestibility.

Sunshine and fresh air. Sunshine will kill tubercle bacilli quickly; therefore rooms, bedding, and clothes should be exposed to the sun daily when this is possible. The patient should be kept in the open air whenever possible. Breathing out of doors is apt to be slower, and deeper in the lungs, instead of only in the upper part of the lungs where the disease is most severe. The air out of doors is fresher and more invigorating, and less likely to be overheated. All statistics indicate that open-air and sunshine treatment give the patients greater resistance against the disease in general.

In giving treatments in the sun, care must be taken to see that the first treatments are not too prolonged, as severe burns may be caused by the sun if the patient is exposed too long before the skin becomes tanned. Blonds, particularly those with a tendency to red hair, burn more easily than do brunettes; so extra care should be taken with them. Not only can the skin be burned, but the health of the patient injured and his resistance lowered by too much light.

Treatment with ultra-violet lamps is frequently used with good results when exposure to sunshine is not possible, and in cases of bone tuberculosis these treatments are often used in place of, or together with, sun treatments. No one should attempt to use one of these lamps unless he is trained in its use or is under the guidance of a physician. With some types of lamps very severe burns can be made if the treatments are not given correctly, and, if the treatment is too prolonged, the immunity instead of being raised may be quite definitely lowered.

The rays which are of the most benefit to the body are the ultra-violet, which are rays shorter than light and invisible to our eyes. These rays do not pass through ordinary glass, but there are several firms manufacturing special glasses that in part allow the passage of the ultra-violet rays. These glasses are used in nursery windows and sun porches, and they are useful during cold weather or for prolonged treatments. A nursery equipped with glass of this type would be a means of preventing rickets, and would be beneficial in many ways to children kept indoors during very cold weather.

It is the short ultra-violet rays that burn, and lamps that screen these out while they permit the passage of the longer ultra-violet waves are now made. These may be used under a physician's directions in the home.

There are many lamps on the market that are violet ray rather than ultra-violet ray lamps. The bulbs are of ordinary glass of a violet color, and give off no ultra-violet rays at all.

Tuberculin. Tuberculin is a preparation which is made from cultures of the bacillus of tuberculosis. It is injected hypodermically and is used both for diagnosis and for treatment. When injected with tuberculin, those having tuberculosis react differently from those who do not have it. At first it was hoped that tuberculin could be used to build up the immunity and that it would prove to be a specific cure for tuberculosis, but this has not proved to be generally true. It is toxic, and when given for treatment it must be used very carefully.

Just how tuberculin acts is not fully understood. In some cases the results of its use have been remarkably good; most patients take it well and receive some benefit, but in a small group of cases the reaction is not good and there is no benefit. If it is given carefully, it does not harm the patient and may do good.

Medicine in tuberculosis. Medicine of any kind is usually of little benefit to tuberculous persons. Cod-liver oil is used, particularly with children, as it supplies vitamins necessary for growth and health; sometimes a simple tonic is given to increase the appetite; but the giving of medicine is such a small part of the treatment in these cases that it need hardly be considered here. The many advertised patent medicines, "sure cures" for this as well as other diseases, are not only worthless as part of the treatment, but worse, as in many instances the correct treatment is delayed and thus valuable time is lost because of faith in some advertised medicine.

Change of climate. Some few years ago complete change of climate was ordered for all tuberculosis cases; this is no longer considered necessary or desirable. If a patient is accustomed to one climate, a change may have a bad effect. Changes in altitude often affect the heart; changes in weight of air often cause difficulty in breathing; moving from one part of the country to another may delay the beginning of the treatment and cause unnecessary fatigue and excitement. If the change

is made because of a move to a sanatorium or hospital where treatment can be given better than at home, the benefit to be derived from the change of environment may of course overbalance the disadvantages of the move.

Hospitals and sanatoria. Many cases of pulmonary tuberculosis are cured by home treatment, particularly when the disease is in its early stages. If rest, — uninterrupted rest, with freedom from worries and anxieties, — the correct routine of sleep and of food, sunshine and fresh air, and someone to wait upon and look after the patient can be secured, there is no reason why he should leave home on his own account. But if these conditions cannot be met, it is much better that he should be treated in a hospital or sanatorium. At those places set aside for treatment of this disease, the surroundings are ideal and the chances of recovery much greater. If there are children in the household, or others who are in a run-down condition and therefore likely to be susceptible to the disease, it is usually much better for the patient to leave home.

Many hospitals exist which are given up entirely to the treatment of tuberculosis. Some are expensive to the patient, but others are supported by states, counties, or cities, and in these the patient has little or no expense to bear. There are several advantages in the hospital: (1) The discipline is advantageous. Too often members of a family yield too much to the wishes and ideas of the patient. (2) The required rest, quiet, and freedom from interruption are secured in a hospital, whereas in the home these are often difficult or impossible to obtain. (3) The proper food is supplied. In the home there is often a tendency for the patient to choose an inadequate diet or to eat indigestible food. (4) The hospitals are built with sleeping porches or open wards so that a patient can be out of doors day and night. In the home many patients want to remain in close, hot rooms.

Home treatment. If home treatment is decided upon, a little ingenuity will enable one to sleep and rest in the open air.

Porches of course can be used, or open windows with window tents; or if one can stand the direct current of cold air, simply sleeping with the head at the window will be all right.

Societies which send out social workers to supervise and assist in home treatment have been formed in various cities. Hospitals also have social-service workers in many of the cities. These social workers go into the homes and help, by their advice and by necessary financial assistance, to arrange matters for the patients. They help to build porches or to make other arrangements for out-of-door sleeping; they also provide milk, eggs, and other nourishing foods. Patients are instructed in the care of themselves, they receive record sheets upon which they are expected each day to put down the amount of food taken, the amount of sleep and rest, and their various symptoms. Physicians prescribe the whole life of the patient, even to the number of visitors allowed. During the patient's confinement in bed, a nurse makes visits to the home; she gives treatments or baths, or supervises and instructs the home nurse in giving them. Much of this work is done by the Instructive Visiting Nurses in the various cities.

Importance of after care. Patients should continue the rest and open-air treatment for several months after the active symptoms of fever and cough have disappeared. There are undoubtedly a large number of relapses which occur after it seems that a cure has been completed. This is largely due to the fact that the treatment is discontinued too soon or because necessary care has not been practiced after a normal life is being led. No treatment should be discontinued until the patient has undergone a thorough examination given or supervised by his physician. This examination should include an X-ray, as often all outward signs of the disease may have disappeared but the lungs will still not be healed. If the results of the examination are negative, and the patient is pronounced cured, he should continue under observation for two years or

more, living a healthful outdoor life and avoiding all excessive fatigue.

Tuberculosis of the bones and joints. Tuberculosis of the joints is considered secondary to infection of the lymph nodes. It is the most destructive of all joint diseases and is the cause of great deformity. It most frequently affects the joints of the spine, and causes many cases of deformity of the spine, or humpback. It is spoken of as Pott's disease, named for the physician who first determined the cause of the condition. Most of this deformity is preventable, particularly that of the spine; but if deformity is to be prevented, treatment must begin early, before there is much bone destruction.

The symptoms which can be observed in the early period of the disease are at first the same as in any beginning tuberculous condition — loss of weight, easy fatigue, and general poor condition; but in bone tuberculosis there is the added symptom of pain. If the knee, hip, or ankle joints are affected, limping will be an early symptom. Frequently the child will cry out in the night without apparent reason.

Treatment of bone and joint tuberculosis. In this form of tuberculosis, as in the others, rest is most important. The diseased bone should be fixed in position so that movement is impossible. Good food, fresh air, and generally good hygienic conditions are necessary. Unless these can be secured in the home, it is best to have the treatment given in a hospital. The skillful handling by the nurse, the constant care of the doctor, and the regularity of the life in the hospital make recovery with a minimum amount of deformity more sure.

In cases of Pott's disease, treatment should begin as early as possible, if deformity of the spine is to be prevented. The fact that one or more of the vertebræ is being destroyed causes the spine to yield to the weight of the body until it is bent forward and a hump is formed upon the back. This bending forward of the body not only affects the shape of the spine, but also tends to press the organs down and interfere with the function of the

lungs and heart; and because of pressure on the spinal cord, the deformity of the spinal column is sometimes followed by paralysis below the seat of the disease. It is considered best to place the child in a reclining position on a frame during the acute stage of the illness; later the body can be held erect with a plaster cast, and still later a brace may be used. This brace should be worn for a long time, for if the body is not supported, there is a possibility of increased deformity in later years. After a jacket is applied, the child should be watched and brought back to the surgeon if he complains of discomfort or if the edges of the cast rub at the arms or thighs. Children become accustomed to discomforts much more easily than one usually believes, so that if there is persistent fretting, there is the possibility that ulcers may have formed or some condition exists which is causing pain. The surgeon is the one to decide whether it is necessary to remove the cast or if it can be trimmed to relieve the pressure.

Cases of Pott's disease are given the sunlight treatment; if it is impossible to keep the child in the sunshine, he should be treated with the ultra-violet lamp. Many surgeons advise the lamp treatment in all cases of tuberculosis of the bones and joints.

Latent tuberculosis. Many persons who contract tuberculosis during childhood check the disease of themselves. In them the germs become enclosed and lie dormant; but if the resistance of the person is lowered, the bacilli are likely to spring into activity again. This occurs most frequently at about eighteen or twenty years of age, and at this time there should be special attention given to the health.

Girls are especially liable to the disease, and in recent years it is only among young women that the tuberculosis death rate has failed to fall. Among them there has been a slight rise, usually attributed to underfeeding in order to keep slim, and perhaps to late hours and not enough sleep. Such practices, along with going out in all kinds of weather with the feet and

ankles unprotected, not removing damp shoes and stockings, and wearing insufficient clothing, as many girls do, lower the resistance of the body to all diseases, but more particularly to colds, pneumonia, influenza, and tuberculosis.

After the age of twenty-five tuberculosis is less common, and as people get older the danger of contracting it or of bringing it into activity becomes less.

In conclusion, we should perhaps mention the fact that a wider adoption in hospitals and sanatoria of a method of treatment that has long been known is bringing new hope to many tuberculous patients. As we have pointed out, rest is very beneficial to the patient; the less movement there is of an infected lung and the less taking of air into it the more tendency there is for the germs in the lung to die out and for the lesions to heal. Acting in accordance with this principle, physicians now often in selected cases introduce air or some other gas into the chest cavity so that one lung will collapse and not be used in breathing at all. Then, after this lung has healed, the other is rested in the same manner. One advantage of placing a tuberculous patient in a sanatorium is that he then has attention from physicians who have had experience as to when this treatment should be used and who are skilled in carrying it out.

QUESTIONS

1. From what two sources may tuberculosis be contracted?
2. In what ways is the disease transmitted from these two sources?
3. What particular care should be taken to protect the children (especially the baby) of a tuberculous mother?
4. Under what conditions will tuberculosis germs continue to live?
5. Under what conditions are they most quickly destroyed?
6. How do tuberculosis germs enter the body?
7. By what means could this disease be completely stamped out?
8. Mention some of the early symptoms of tuberculosis of the lungs.
9. What forms of the disease are children most likely to have?

10. What is the first and most important part of the treatment of all forms of tuberculosis?
11. Mention other essential parts of the treatment.
12. Describe the process of examination for tuberculosis of the lungs.
13. Why should extreme care be exercised in giving treatments with the ultra-violet ray?
14. What advantage has hospital care of tuberculosis cases over home treatment?
15. How long after a patient is pronounced cured should he continue to exercise special care?
16. What are the symptoms of bone tuberculosis?
17. What is Pott's disease?
18. How should it be treated to prevent deformity?
19. What is meant by latent tuberculosis?
20. At what age are girls most likely to develop tuberculosis of the lungs?

CHAPTER TWENTY-FOUR

TYPHOID FEVER AND PNEUMONIA

Two of the diseases which it is most important for the home nurse to understand are typhoid fever and pneumonia. One reason for this is that both diseases are communicable, and in both, the recovery of the patient depends to a very great degree on the nursing. A second reason is that measures that must be taken to prevent spread of the infection are very similar to those required in cases of many other diseases, and the nurse who learns to carry out the simple precautions necessary to insure her own safety and that of other members of the household in these infections will find the knowledge useful in caring for cases of other diseases. A third reason is that the home nurse is likely to have a case of typhoid fever or pneumonia on her hands at some time. A mild case of typhoid fever can sometimes be taken care of without employing a trained nurse; and pneumonia comes on so suddenly and is so serious in its first stages that it may not be possible to get a trained nurse until the disease is well under way.

Even if a trained nurse can be employed, the necessity for constant attention is such that some member of the family is almost always called on to assist in the care of the patient; and the more intelligent the amateur nurse proves, the better it is both for the patient and the trained nurse. It is one of the most restful and comforting things in the world for a nurse to find that a person who is willing to help is really going to be a help and not an added responsibility.

Choosing and caring for the sick room. The proper selection of a room for a patient suffering from typhoid fever or pneumonia is very important. It is especially desirable that the room of a typhoid patient be next to a bathroom, in a quiet part of the house. Sweeping should be done with a damp broom or with a broom covered with a damp cloth, and dusting

with a damp cloth ; or an oiled mop and dustcloth may be used. If the patient is nervous or delirious, it is often better for the nurse to take care of the room herself. All food and medicines should be given regularly, and exactly according to the directions of the physician. The whole plan of the treatment may be disarranged if some apparently trifling thing is omitted or changed. In fact, it may be said that there are no trifling things in the business of nursing.

TYPHOID FEVER

The germ of typhoid fever is taken into the body through the mouth and thrown out in the excreta. There is usually a quite generalized infection, but the germs attack especially the intestine, particularly the lower part of the ileum, forming ulcers in the collections of lymph nodes called "Peyer's Patches" that are found in the intestinal walls. The incubation period is from ten days to three weeks.

Most cases of typhoid are contracted from contaminated milk or water, and in small towns and rural regions flies are important means of spreading the contagion. In milk the germ may live for a long time, but it dies quickly if exposed to sunlight and air. In water it lives only about seven days. Many cases of typhoid ("vacation typhoid") occur among persons who have been away from home for the summer or for a few weeks, the disease being contracted by drinking polluted water or contaminated milk, and appearing after the return home. A considerable number of persons who have typhoid fever carry the germ after convalescence sometimes for several months and sometimes as long as the person lives. These "typhoid carriers" are a real problem in controlling the disease.

Symptoms and course of the disease. The first symptoms of typhoid fever are headache ; nausea ; pain in the back, legs, and abdomen ; loss of appetite ; sometimes bleeding from the nose ; constipation followed by diarrhea ; coated tongue ; and

a characteristic rash which appears generally upon the abdomen. Later in the disease the physician's examination will reveal an enlarged spleen, and the diagnosis may be confirmed by a test of the blood. The stools become liquid and the color of pea soup. The temperature rises steadily, reaching 103° or 104° at about the end of the first week. It usually remains at this point for about three weeks, and then begins to decline.

In some cases the fever ends in two weeks, and in others it continues to the fifth or sixth week; but in normal cases of typhoid the temperature should begin to go down by the fourth week, a little lower each day until the normal point is reached. The pulse is slow in proportion to the fever, not becoming rapid until a later stage of the disease or until the patient has become weak. Sometimes it reaches its highest rate when there is no fever. Any sudden change in temperature or pulse in the midst of the illness is a danger signal.

Typhoid patients are liable to sudden changes and relapses which make it extremely necessary for the nurse, even if she is in charge for only an hour, to be thoroughly informed regarding the nature and course of the disease. A nurse usually instructs the member of the family who relieves her, as far as she can, but in the stress and hurry of illness it is not easy to give comprehensive instructions even if one has a talent for teaching. The amateur assistant should get all the information she can beforehand from the physician and the nurse, and if there is any doubt about remembering the various points she should keep a notebook.

Care of excreta. The disinfection of excreta in typhoid cases is important, and this includes urine as well as the discharges from the bowels. Pouring a disinfectant solution on excreta and emptying the vessel at once is not enough; it should be allowed to stand, covered, for an hour or more for the disinfectant to take effect. The best disinfectants for the bowel movements are limewater, and carbolic acid solution with one part of acid to twenty parts of water, or formalin.

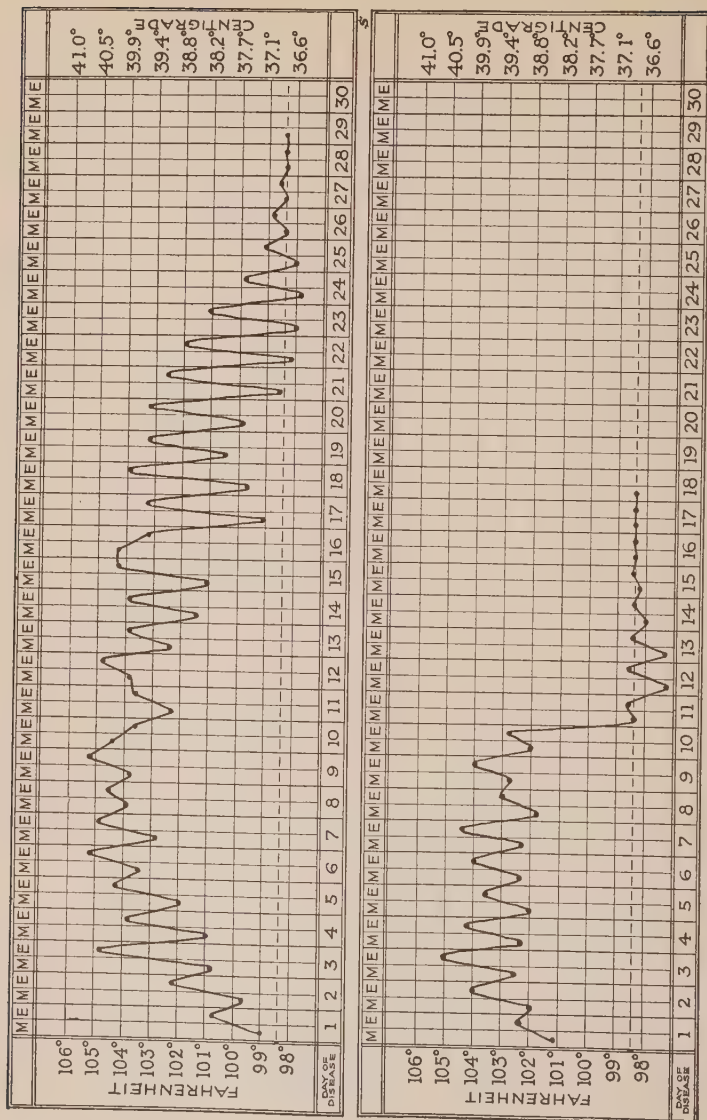


FIG. 57. Temperature charts in a case of typhoid fever (upper figure) and in a case of pneumonia (lower figure). In typhoid the fever disappears by crisis (gradually); in pneumonia it disappears by crisis (suddenly).

No bedpan should be emptied without careful examination, and if there is any unusual appearance whatever the stool should be saved. As is explained later (page 278), a doctor or a nurse will detect signs of a hemorrhage when the untrained eye does not. Blood coming from the bowels, unless near the rectum, changes color completely before it is passed.

Bathing, and the "drop." Sponge baths are given every two or three hours, according to the necessity of the case and the degree of fever. The temperature is taken upon the hour indicated. If the fever reaches the point where the bath is necessary, the patient is bathed for fifteen or twenty minutes, dried, covered up, and left to rest (page 309). At the end of half an hour the temperature is taken again, and this temperature indicates what is called the "drop" from the bath, or the result of the bath. In recording the temperature, the "drop" is not put in the line with the other temperature on the chart, but is put directly under the temperature taken at the regular hour before the bath was given. Down from this is drawn a dotted line to indicate that this last temperature was the "drop."

Hemorrhage in typhoid fever. Hemorrhage from the intestine is one of the common complications in cases of typhoid. Often the first indication of this is a lowering of the temperature. If there is a radical difference in temperature from the last one recorded on the chart, the thermometer should be well shaken down, the mouth examined to see that it is not too dry, and the temperature taken again. If this difference still appears, the fact should be reported immediately to the nurse, or, if you are taking care of the patient without a nurse, call the doctor. The blood does not always show at first, especially if coming from high up in the intestine. After reporting to the nurse and the doctor, place hot-water bags at the feet if they are cold, and an ice bag on the abdomen. If the hemorrhage becomes excessive, raise the foot of the bed. The patient must be kept absolutely quiet, and not allowed to

suppose that there is anything wrong. If there has already been a hemorrhage or the doctor has reason to fear one, the nurse should get from the doctor explicit directions for such an occurrence. It is always best in taking care of such a case to have the doctor leave directions for all possible emergencies so that no time may be lost in carrying them out. At critical times the loss of a very few minutes may be disastrous.

Delirium. The typhoid patient should never be left alone. Delirium is often not recognized immediately. The patient may be able to talk intelligently on any subject, answering questions coherently, and still be slightly delirious. The delirium shows at night, as a rule, and often takes the form of wanting to get out of bed; in many cases the patient has a persistent idea that there is something, either business or pleasure, which he must get out and attend to. The patient does not always speak of this idea, but when left alone he immediately takes the opportunity to get up and try to carry it out, often with serious and disastrous consequences to himself.

If there is extreme fever or delirium, the ice bag should be kept at the head. The patient should be kept quiet; there should be no talking or whispering, and the light should not shine into the eyes. The bed should be so placed that the patient does not face the light, and any artificial light should be covered. Not only is the glare of the light a strain on the eyes, but it may increase the tendency to delirium. The patient should not be allowed to sit up or move very much unassisted, as there is always danger of heart failure.

Bed sores. From the very beginning of a case the possibility of bed sores must not be overlooked, as this is one of the complications most to be dreaded in typhoid fever. Nurses called to a patient after the disease has made some progress often find the beginning of such a sore, due to the ignorance of the family. The back, elbows, heels, shoulders, and any part which presses against the bed may become sore.

The under sheet must be kept absolutely smooth, and the

parts of the body that touch the bed clean and dry. These parts should be frequently rubbed with alcohol and alum, the rubbing being done in small circles. The object of this treatment is to toughen the skin and to keep up the circulation of the blood, as a bed sore is due to the lack of circulation caused by the constant pressure of the body against the bed. If the skin is reddened and shows signs of becoming sore, continue the rubbing unless the skin is broken.

Salves soften the skin and encourage the formation of bed sores, and should be used only after the skin is broken. Oxid or stearate of zinc ointment helps to heal a broken sore. If powder is used on the back, rub the hand over the powder to keep it from forming lumps. Rubber rings can be bought to put under the back and keep it from pressing against the bed. Rings to fit elbows, heels, or any other part of the body may be made of absorbent cotton wrapped with a bandage.

Diet in typhoid fever. Due partly to the fact that the secretions of all the digestive juices are diminished in typhoid fever, the diet is one of the most important parts of the treatment. With improper food there is a tendency to putrefaction in the intestines, with the formation of toxins, or to fermentation and the production of gas with its resulting distention of the abdomen. If the patient is correctly fed the attack will probably be less severe, and there is less reason to fear a relapse or secondary infection.

It is true that the feeding of the typhoid patient must be, to a certain extent, individual — that food that is palatable and easily digested by the particular individual who is ill should be selected. At the same time it is best to give a good mixed diet which includes a sufficient number of Calories to keep the patient well nourished. This should include fats as found in cream, butter, and egg yolks; fruit juices; well-cooked thin cereals; and milk and meat juices if they are well borne. Milk is no longer believed to be the perfect food in typhoid. It is

not always easily digested, and in order to give sufficient nourishment a large quantity must be taken.

It is best to give small quantities of food at intervals of three hours, rather than to risk overfeeding at longer intervals.

Precautions to be taken by the nurse. The nurse should be inoculated with typhoid vaccine to raise her immunity against the germ. She should also take every care to avoid the infectious material, never lying down on the bed beside the patient, never eating food left in the room, disinfecting her hands after emptying vessels or handling the patient, going out into the fresh air each day, and disinfecting mouth and throat before eating.

Anti-typhoid vaccination. The value of vaccination or inoculation against typhoid fever is established. It was introduced into the English army by Sir Almoth Wright, and met with such success that it was soon used in other countries. It was used first in the United States army in 1909, and at that time only soldiers voluntarily submitting to the treatment were vaccinated. The results were so satisfactory that in 1911 it was made compulsory for all soldiers under forty-five years of age. The immediate decrease in the number of cases and deaths was marked. In 1913 not one death occurred in the United States army from typhoid fever, and inoculation against this disease was a standard sanitary practice in all the armies engaged in the World War.

Nurses and doctors in many hospitals are vaccinated against typhoid, and some railroads and mills encourage vaccination among their employees who must live or work under insanitary conditions. Children are peculiarly liable to the disease, and it is an excellent plan to have them vaccinated against it. Since automobile touring has become the custom, "vacation typhoid" accounts for a considerable percentage of cases, and many health officers recommend inoculation before the tour begins.

It is not yet known how many years the immunity due to the effects of the inoculation actually lasts, but in the army it is considered best to repeat it every four years. This rule is a good one, and if one is nursing a case of typhoid fever or going to some place of uncertain sanitary conditions, it would be well to be revaccinated after a shorter interval.

Directions for using the vaccine. Three doses of typhoid vaccine are given at intervals of from seven to ten days. The best hour to take it is late in the afternoon, for as the reaction does not begin until three or four hours after the dose is given, the effects will be felt at about the hour for retiring and will wear off before morning. One should not exercise violently after taking the dose, and it should not be given to a woman immediately before or during menstruation.

The effect upon the system varies with the individual. There may be a rise in temperature to 101° or 103° , but in many cases there is merely a feeling of discomfort. There is a greater reaction after the first and the second dose than after the third. With children, there are practically no bad effects, though there is sometimes a slight local irritation at the point of injection. This inflammation may spread to the nearest lymph nodes. It lasts only from twenty-four to forty-eight hours.

PNEUMONIA

Many of the diseases that formerly ravaged mankind have been conquered by the advance of medical science and are now, in civilized lands, little more than memories. Not so with pneumonia. It remains as one of the greatest of all causes of death; notwithstanding the constant and continued study of it, no effective means of prevention or any certain remedy for it has been found. However, much has been done to improve the treatment, and there is reason to hope that at an early date a very great reduction in the death rate from this disease will be brought about.

The pneumonia germ. The usual cause of pneumonia is a bacterium called the *pneumococcus*. There are many types or varieties of this, but probably a majority of cases of pneumonia in adults are due to Type I, II, or III. These types are rarely present in the mouths of healthy persons except in the mouths of those nursing or coming in contact with patients ill with the disease.

Other varieties of the pneumococcus were formerly grouped under Type IV, but it was found that this group is merely a great collection of different types that had not yet been classified. About thirty of these varieties have now been distinguished, each of them quite distinct from all the others; and since the germs in some cases differ from any of these types, it is evident that there are still other varieties that must be recognized. Unfortunately a different serum seems to be required to protect against each type of the germ, and this has made effective serum treatment of the disease very difficult.

Lobar and broncho-pneumonia. In broncho-pneumonia the infection is chiefly in the smaller air passages. In lobar pneumonia the air sacs become filled and there is complete involvement of the part of the lung affected.

In lobar pneumonia there is a well-defined onset. The first symptom is usually a chill, followed by a rapid rise in temperature. There is pain in the side; a cough and bloody expectoration ("prune juice" sputum); and shortness of breath. An examination shows consolidation of the lung tissue — an area into which the air does not enter. The fever lasts from seven to nine days and ends with a sudden drop or crisis. From 25 to 50 per cent of lobar pneumonia cases begin with an acute cold, and this type frequently follows influenza, measles, and whooping cough.

In broncho-pneumonia the onset is more gradual, and it occurs usually as a complication following another disease. It differs in many respects from lobar pneumonia. It runs an

irregular course, and there is frequently an absence of definite symptoms.

Predisposing causes of pneumonia. The percentage of pneumonia cases is greater among men than among women, probably because among men there is a greater opportunity for infection. Chronic alcoholism predisposes to pneumonia, and alcoholic pneumonia is one of the most fatal types. The disease is more common during the winter months, and many cases follow neglected colds or a condition of long-continued chilliness. General debility from hunger and fatigue, exposure to wet and cold, and later stages of heart disease are also predisposing conditions. There are more cases of the disease in the city than in the country. Like other respiratory infections, pneumonia is a crowd disease.

Making the diagnosis for the type of germ. In order to distinguish the different types of pneumococci, it is necessary to make an examination of the germ. These are usually secured from the sputum, and for purposes of diagnosis the sputum should be collected in a small, wide-mouthed, sterile bottle. No disinfectants should be used in cleaning the bottle, but it should be boiled, then handled carefully so that neither the mouth nor the inside of the bottle shall be contaminated by a touch.

General treatment and nursing. The general treatment of a pneumonia patient consists of rest, proper feeding, water in abundance, and fresh air. All visitors should be excluded from the room, and only the necessary nurses and assistants allowed to enter. There should be a minimum amount of talking on the part of the nurses, and the patient should be spared all possible exertion. He should be fed, and should be lifted when it is necessary to turn him. Weakness of the heart is one of the complications of pneumonia, and a sudden movement might be a cause of heart failure. Even after convalescence is well established, the patient should avoid violent exertion. He should be turned at intervals to prevent a plugging of the

bronchi with the mucus that is excreted during the disease.

In that type of pneumonia which ends with a crisis at the seventh to the ninth day, the patient must be carefully watched; for although it is only one stage of the disease, the drop in temperature is frequently accompanied by extreme prostration, and this period is therefore a critical time for the patient. Heat should be applied externally, the pulse carefully watched, and a heart stimulant given if necessary. The patient should be kept as quiet as possible and disturbed for baths and treatments only when absolutely necessary. The air in the room must be kept fresh and the temperature moderate.

Delirium often comes early and continues well into the disease. The patient must not be left alone and must be carefully watched to prevent his getting out of bed or sitting up suddenly. An ice bag can be kept upon the head. If the fresh-air treatment is used, the patient must be protected against the cold with light-weight woollen covers and wraps. His strength must be kept up with nourishing, digestible food, but overfeeding should be avoided. The bowels should move regularly, and no distention of the abdomen be permitted, as the pressure of gas in the intestines will increase the difficulty in breathing and also make more difficult the circulation of the blood. The bowels should be regulated by small enemas or irrigations, not by cathartics. If there is excessive pain from inflammation in the pleuræ, this can be checked by strapping with adhesive plaster — this, of course, to be done by the doctor.

The pulse must be watched and changes reported to the doctor, as the treatment of the heart is one of the important means of helping the patient to stand the long strain of the disease. If breathing is difficult, oxygen is administered. This lightens the work of the heart by allowing more oxygen to be absorbed and thus lessening the amount of blood that the

heart must pump. As the germ is found in the sputum, the same care must be taken in disinfection as in cases of diphtheria and tuberculosis.

Medical treatment of pneumonia. According to the best medical opinion the most effective treatment of lobar pneumonia is a combination of serum and of new drugs (sulfapyridine, sulfathiazole) derived from sulfanilamide (page 199). The proper procedure when a case develops is to send a specimen of the sputum to a laboratory at the earliest possible moment in order that the type of germ may be determined. Where facilities for typing the germ promptly are not available or where a physician has not been called early, a serum containing antibodies against several of the most common types can be used. As yet the serum is expensive, but it is so effective that in some states it is provided at public expense for those unable to pay for it. Some authorities believe that by the new serum treatment and the use of the new medical remedies the death rate from pneumonia can be reduced as much as 75 per cent.

It is highly important that the treatment be started early. If administered late, the serum does not have the same beneficial effect as when it is given in the first stages of the infection. It is a great mistake to delay the typing of the germ until the patient is in a critical condition and the time for the effective use of the serum is past. Like sulfanilamide, the compounds derived from it have certain effects upon a patient that must be watched. Only a physician is qualified to administer them and to determine the dosage.

Diathermy in the treatment of pneumonia. For many years pneumonia was treated by the application of heat through hot flaxseed poultices. It was believed that heat stimulated the absorption of waste products and relieved pain and congestion. Today heat is still used, but in hospitals the electric diathermy apparatus has taken the place of poultices.

In the diathermy treatment, pads or electrodes are placed on opposite sides of the part to be treated and a high-frequency

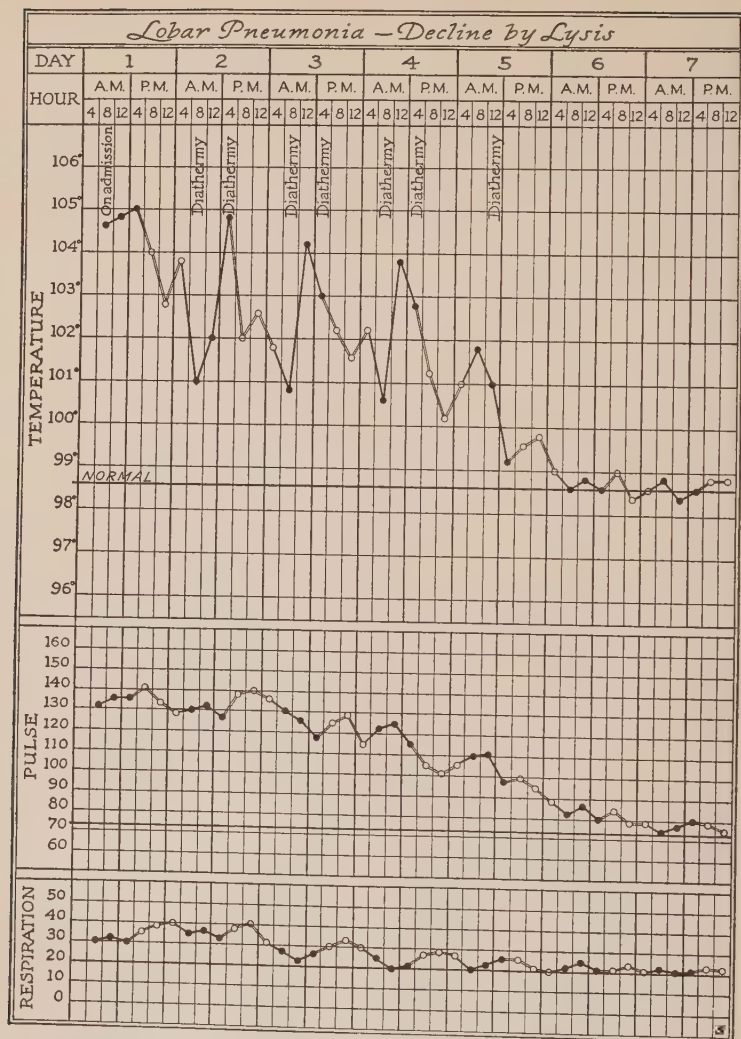


FIG. 58. Temperature, pulse, and respiration chart of a lobar pneumonia patient treated by diathermy. The condition of most pneumonia patients is improved by this treatment and under it the case usually ends by lysis instead of by crisis.

electric current is thrown back and forth through the tissues. This heats the tissues, and by the use of electrodes of the same or different sizes the location of the point of greatest heat can be controlled. With electrodes of equal size the hottest point is in the center, but with one electrode small and the other large the point of greatest heat is nearest the small electrode. With this apparatus it is therefore possible to bring any part of a patient's lungs to the desired heat.

With diathermy treatment pain is lessened, respiration and pulse are slowed and strengthened, cyanosis and dyspnea are relieved. The patient sleeps better and becomes more hopeful. In 95 per cent of the cases reported the temperature has come down by lysis instead of crisis. With this treatment the course of the disease is shortened, the heart is much stronger, and the patient not so prostrated.

Diathermy is also used with success in the treatment of arthritis and other joint conditions; in neuritis, bursitis, and in many other inflammatory conditions which are relieved by heat. Because the heat from diathermy is within the tissue where it is wanted and not outside on the sensitive skin, this treatment is much more effective than trying to heat the inner parts with hot applications or with infra-red rays or other radiant energy applied to the surface.

Malaria. Malaria is not so widespread as formerly, but because it still costs the people of our country 500 million dollars a year a word about it is inserted here. It is caused by a germ which lives in the red blood corpuscles and is contracted through the bite of a certain species of mosquito. The symptoms in an acute attack are a chill, followed by hot fever. The patient should be cared for in a way that will help build up his immunity. Rest and diet are important. Applications of heat to the feet during chills, and cool drinks and bathing during fever, are helpful. Between paroxysms exposure to the hot sun should be avoided, as this may bring on an attack. Quinine is a specific for the disease, but it should

be used only under the advice of a physician. It has a powerful effect on the nervous system, and if it is not employed in such a way as to kill *all* the germs promptly there is danger of getting a race of them that are partially immune to it.

The malaria mosquito may be recognized by its spotted wings and its habit of standing up on its head when it is at rest. Its breeding habits are now well known, and anyone in a malarial region can secure from health authorities full directions as to how best to guard himself from the disease.

QUESTIONS

1. Give reasons why it is especially important for the home nurse to understand the care of typhoid fever and pneumonia patients.
2. How is typhoid fever contracted?
3. Give the symptoms and describe the course of the disease.
4. How is the excreta disinfected?
5. How may the fever be reduced, and what is meant by the "drop" ?
6. What are the symptoms of hemorrhage in a typhoid patient, and what should be done in case of one?
7. How may the danger of delirium be reduced?
8. How may bed sores be prevented, and how are they treated?
9. Give some important points in the feeding of a typhoid patient.
10. What should the nurse do to protect herself against the disease?
11. How many types of pneumonia germs have been distinguished?
12. What is the difference between broncho-pneumonia and lobar pneumonia?
13. What are some of the predisposing causes of pneumonia?
14. How is the type of germ determined?
15. What are some of the important points in the general care of a pneumonia patient?
16. Against what types of the germ have serums been prepared?

CHAPTER TWENTY-FIVE

POLIOMYELITIS, SPASTIC PARALYSIS, AND LETHARGIC ENCEPHALITIS

POLIOMYELITIS is popularly known as infantile paralysis. Spastic paralysis is a condition in which the muscles are contracted and the nerves over-stimulated, due to brain injury or complications with certain diseases. Lethargic encephalitis is an infection of the brain commonly referred to as "sleeping sickness." These ailments are not so common as many other diseases; but when cases of them do appear, they are very serious, and usually the patient must be cared for through a long period of time.

POLIOMYELITIS

In poliomyelitis prompt medical attention is so important that the early symptoms and the treatment should be understood by everyone. The disease occurs most often in epidemics, but sporadic cases also appear. Children under five years of age are most often attacked, but older children and, in isolated cases, adults also contract the disease. Epidemics occur most frequently during the summer months, but occasional cases and even some epidemics have occurred in cold weather. A large percentage, however, of both children and adults are apparently immune to the disease.

The germ has not been isolated to the satisfaction of all authorities, but by inoculation of animals it has been proved that it occurs in the secretions from the mouth and nose, from inflamed eyes and ears, and in the urine and in excreta from the bowels. It is believed that the germ is transmitted by direct contact in kissing, by eating and drinking from infected dishes, by droplets thrown out into the air surrounding the patient, and by flies. Animals such as cats and dogs do not contract the disease, but it is possible to infect monkeys and rabbits with it.

Preventing the spread of the infection. The patient is most dangerous to others during the first week, while there is inflammation of the throat and the nose; but he may infect others for a period of at least three weeks. Each case should be strictly isolated until all danger of communication of the disease is past. Secretions from the throat or the nose should be caught in cloths or paper napkins and burned; urine and feces should be disinfected; all dishes used by the patient should be disinfected; and the bedclothes should be sunned or boiled. The nurse should avoid all contact with others, for fear that she may carry the disease to them; and "contacts" (those who have been exposed to infection) should be isolated for two weeks.

The following are the regulations of the State Board of Health of New York for the control of this disease:

1. If any of the symptoms described appear in a person of your household, summon a physician immediately, whether poliomyelitis is prevailing or not. Keep other members of the family away from the affected person. If the case is found to be one of poliomyelitis, the following measures should be taken:
2. Protect your family by sending the patient to a hospital, if the family physician approves of this course. If hospital accommodations are not available the patient must be isolated at home, as your physician and health officer will direct. If the patient remains at home, provide a nurse if possible.
3. The patient must be isolated for three weeks from date of onset of the illness. Children who have been in contact with the patient must be kept under observation by the health officer for two weeks from the date upon which they last saw the patient.
4. The proper disposal of the discharges from the nose, throat, and bowels, not only of the patient but of all in isolation, is of the greatest importance in preventing the spread of the disease. Handkerchiefs or soiled clothing should be immediately boiled. A disinfecting solution for treating discharges from the bowels should always be kept on hand. An efficient disinfecting solution consists of one-half pound of chloride of

lime in one gallon of water. Urine and discharges from the bowels should be received in bedpans or other vessels containing a small amount of disinfectant. Later, the discharge should be liberally covered with the disinfectant and allowed to stand, covered, for one hour; then the receptacle with its contents may be emptied into a water-closet or a trench, located at a considerable distance from the house and covered to exclude flies. The receptacle in which discharges are received should be immediately disinfected by washing and rinsing with boiling water. Immediately after caring for the bedpan, after handling the patient and before meals, the hands of the nurse or attendant should be thoroughly washed with soap and water and disinfected with a 1 to 2000 bichloride of mercury solution, or with lysol, one teaspoonful to a pint of water.

5. It is often difficult to keep children in isolation during convalescence, unless there is something to occupy their minds. A pamphlet on the subject, "Amusements for Convalescent Children," may be obtained from the State Department of Health or the local health officer.

6. Report immediately to the local health officer the name, address, and previous address of any child coming to your household from a home in which there is a case of poliomyelitis.

Symptoms of poliomyelitis. This disease, like many others, begins like a cold. The incubation period is from two to fourteen days, and some of the following symptoms may be present before there are any signs of paralysis: an apparent cold in the head, weakness, fever, perhaps vomiting and diarrhea or other digestive disturbances, pain, especially along the spine, stiff neck, general muscular soreness, and sometimes convulsions.

Positive diagnosis is made by a spinal puncture and the withdrawing of some of the spinal fluid. In many cases this seems to give a certain amount of relief to the patient, as well as being the means by which the doctor confirms his diagnosis.

Use of convalescent serum. During the epidemic of infantile paralysis in 1916 in New York, and before that date in France, blood serum drawn from convalescents was injected into others suffering from the disease. The effectiveness of this

treatment has been questioned, but it has seemed to help in limiting the severity of the attack and in preventing paralysis, and it is now employed in most hospitals. The difficulty in obtaining a sufficient supply of the serum was at first a serious drawback to the general use of the treatment, but through much effort this difficulty has been largely overcome. It is not known exactly how long after the convalescence the antibodies remain, nor is it yet possible to test convalescent blood in the laboratory in order to determine its effectiveness. It is customary, therefore, to obtain small quantities of blood from as many convalescents as possible and mix them together so that a patient will be sure to receive some of the protective substance.

This serum can be kept on ice for an indefinite length of time, and used for sporadic cases. It should be administered early in the disease, if paralysis is to be prevented. Therefore, during an epidemic, or upon the appearance at any time of an obscure condition of cold and fever, particularly if there is muscle soreness or stiff neck, the patient should be taken immediately to a hospital where the serum can be administered.

Treatment of paralyzed muscles. Many cases where paralysis appears make a complete recovery. In some cases the paralysis disappears rapidly; in others, weeks or months are required for recovery. Frequently the cells of the motor nerves in the spinal cord are injured but not destroyed. If the cells are destroyed, there is no hope of restoring power to the muscles; but if they are merely injured, it is possible to restore the muscles to partial if not complete use by proper orthopedic and physiotherapy treatment.

Treatment should not be started too soon after the attack, and from the first should be given with extreme care; for if a weak muscle is overworked at any time it may deteriorate from over-fatigue, and if it is persistently overworked all chance of its recovery may be destroyed. The child should be kept absolutely quiet for some weeks after the attack, and not allowed to sit up or stand until the surgeon in charge has given

permission; and during this period of rest careful supervision should be given to prevent the drawing of muscles and resulting deformity.

One condition which is frequently met during this time and later is a contraction of the calf muscles and an extension of the feet. Some physicians use splints or plaster bandages on the feet and legs, others use sandbags or pillows, to keep the feet in a flexed position and to keep the weight of the bedclothes from pressing the feet down. A careful coöperation on the part of the mother and the one nursing the child is necessary if bandages are not applied.

The treatments used are massage, heat, and educational exercises. In this form of exercise the patient is taught the object of the exercise and is encouraged to make an effort to contract the muscles affected. Children understand and coöperate more easily than the majority of people would believe: for a child no more than two and a half or three years of age can be made to understand what is wanted, and after being taught to observe the movement in one leg will make an effort to move the other in the same way. If there is extreme weakness or no apparent life in the muscles, assistive exercises are given, in which the physiotherapist makes the movement while the child is taught to make the effort. At first ten to twenty minutes twice a day is long enough for a treatment, including massage and exercise, but as the child and the muscles become stronger the time may be extended to forty or sixty minutes if there are many muscles to be treated. As muscles work best if warm, heat should be applied before giving the exercises. This may be done by hot compresses, by a hot bath, or by using radiant heat from one of the electric appliances made for this purpose.

No case should be considered too hopeless for treatment, and as the process of restoration may extend over months or years, no muscle should be given up as permanently paralyzed until it has been treated for many months. Muscles have devel-

oped and recovered at least partial function after years of uselessness. Cases are known of children who with treatment have become able to walk, although they had gone without treatment for as long as three years following an attack and whose muscles during all this time were wasted and apparently lifeless.

One period during which most careful oversight must be given to persons suffering from infantile paralysis is when they first begin to walk. The paralyzed parts must be carefully guarded against overwork, as an over-fatigued muscle will deteriorate and lose much of the strength which has already been restored.

The back and abdominal muscles should be treated even though apparently normal, as many cases of lateral curvature of the spine occur in infantile-paralysis cases due either to slight weakness in abdominal or back muscles or to the unevenness of gait when one leg is not normal. A careful physician and physiotherapist watches carefully and examines the back so that any unevenness of the shoulders or deviation of the spine can be detected early and the necessary brace applied.

Treatment of paralysis under water. It has become the custom for most hospitals and schools for crippled children to provide tanks or swimming pools in which exercises can be given. The water in such tanks should be of moderate warmth (92° or 93°), and frequently sea salt is added to the water to make it easy for the children to float in it. It has been found that in this way, because of the buoyancy of the water and the even, warm temperature, weak muscles can be made to work when they will not do so out of water. Children, too, can sometimes walk in the water when unable to do so out of it. The exercise in the water strengthens very weak muscles which cannot be exercised voluntarily otherwise, and gradual improvement takes place until the muscles are strong enough to contract under ordinary conditions.

Braces. Every paralyzed child should be under the care of an orthopedic surgeon, and no braces should be put on him unless ordered by the surgeon. Braces are useful in preventing the deformities which frequently follow paralysis, but they must be exactly right to be of service, and as the child grows they must be changed. They should not be too heavy and should not, more than is absolutely necessary, interfere with the use of the paralyzed muscles. The brace maker understands the mechanism of the brace, but not of the body; the orthopedic surgeon understands both, and braces should always be selected according to the surgeon's advice and inspected by him on the child after they have been made.

A brace, by holding the body straight, prevents deformity; but it retards the growth of the muscle more than it aids it, and if a brace is used there is all the more reason for regular massage and exercise.

SPASTIC PARALYSIS

Another type of paralysis which is quite frequently seen is known as *spastic paralysis*. In this condition the muscles are rigid and contracted instead of weak and relaxed as they are in infantile paralysis.

Spastic paralysis is due to some injury to the motor cells in the brain. This injury may have been caused by a hemorrhage in the brain, due to pressure on the head of the infant at the time of birth; it may follow an attack of cerebrospinal meningitis or of encephalitis (inflammation of the brain); it may be a complication of an infectious disease such as whooping cough, scarlet fever, or diphtheria; or it may have been caused by a fall or a severe blow upon the head.

The paralysis may affect only one part of the body, as an arm or a leg, or it may affect the whole body. Frequently the eyes are crossed and speech is difficult, and in many cases the child is mentally below par. Children so affected — even those whose paralysis is apparently slight — are quite nerv-

ous, and a sudden noise, a harshly spoken word, or a blow produces a greatly exaggerated effect. For this reason a child affected in this way should be handled carefully and shielded from excitement.

The appearance of the child is characteristic. Besides the crossed eyes there is a characteristic walk, on the tiptoes with the feet in an extremely pigeon-toed position. If the arms are affected, they are carried in a position of flexion with the hands closed. If the paralysis is extreme, walking is delayed and unless treated the child may never walk. There is marked lack of coördination both in walking and in the use of the hands.

Treatment. Treatment should begin as soon as the condition is realized. It consists of light massage, if it is borne well (that is, if it causes relaxation); but no massage should be used if the rigidity is increased by it. Exercises should be employed to develop muscle control and coördination; they should at first be merely practice in relaxing the spastic muscles, but later they should become controlled active movements.

Treatment under water. Cases of spastic paralysis improve much more rapidly when the treatments are given under water. The warmth and general soothing effect of the water cause general relaxation, and when in this relaxed condition the child can be taught to control his muscles and can be gradually trained and strengthened until he is able to balance and walk. Over-fatigue must be avoided. The mental effort on the part of the child is great, so that the treatment must not be too long and must be discontinued on the first appearance of returning nervousness and fatigue. With severe cases these treatments must be continued months and even years, and both the mother and the technician must exercise an unending amount of patience.

Speech defects may be improved and sometimes completely corrected. The treatments for this purpose should be given

by a specialist in speech work. The eyes should be examined as soon as the child is old enough, and glasses fitted if necessary. Glasses and exercises for the eyes will sometimes correct the crossed condition; if they do not, an operation can be performed later for this purpose.

If the rigidity of the muscles does not yield to physiotherapy, two possible operations can be performed to overcome this condition. By one operation some of the fibers in the nerves leading to the contracted muscles are cut, so that the stimuli sent to the muscles are weakened and the muscles are not made to pull with such force. By the other operation the tendons attached to the rigid muscles are lengthened, which helps to prevent excessive contraction.

LETHARGIC ENCEPHALITIS

Lethargic encephalitis is a disease in which there is excessive inflammation of the central nervous system. It appeared as a comparatively new disease at the close of the World War, and soon became general in all countries. It most often attacks children and adolescents, but older people have it also. It is considered communicable, although the particular organism causing it has not been found. It was at first believed to be one of the complications following influenza, this belief being due to the fact that it appeared at the time of the great influenza epidemic of 1918-1919. It is now considered as an independent disease.

Symptoms. The early symptoms are fever, drowsiness, and sometimes unnaturally prolonged spells of sleeping. Later the symptoms become more severe and may involve the digestive organs, leading to vomiting and diarrhea. The sleepiness may become coma (insensibility). The after-effects of the disease are frequently very severe, and it is because of these after-effects that it seems necessary for the disease to be understood.

At first, even if there seems little injury following an attack, the patients are nervous, easily confused, and tired. Many

times they become mentally slow. They may show aphasia — an inability to recall words to express their thoughts and to understand the meanings of words used by others. The patients cannot endure pressure or carry responsibility, and they must not be hurried or scolded if they are not so quick to understand as they formerly were.

Other more serious conditions which may follow this disease are paralysis of either the flaccid (relaxed) or spastic type; epilepsy; mental weakening; and changes in the moral nature and behavior, which lead to disobedience and sometimes to acts of cruelty quite in contrast with the patient's previous conduct. Sometimes the person is left in a stupid condition in which there is imperfect coördination of the muscles and a heavy, sluggish condition of the mind.

Institutional care is best for those whose conduct is affected. Others can be cared for at home. The paralysis and lack of coördination can sometimes be corrected by massage and muscle training. The mental condition also can be improved in some cases; but such children require special teaching, and they should not be expected, at least at first, to compete in classes with normal children. The disease is a most serious one, with a high percentage of fatalities; and it is hoped that means of checking it may be found, and also methods of treating it in its early stages that will be as effective as those employed in cases of infantile paralysis for preventing the very serious after effects.

QUESTIONS

1. What are the early symptoms of poliomyelitis?
2. How is convalescent serum obtained?
3. When should it be administered?
4. Over how long a period is a case of the disease considered communicable?
5. What treatment is given during the acute stage?
6. What after-treatment is valuable in this disease?
7. Give the advantages and disadvantages of braces.

8. What are the causes of spastic paralysis?
9. Give some of the symptoms of spastic paralysis.
10. How is spastic paralysis treated?
11. What is encephalitis?
12. During what period did lethargic encephalitis first appear as an epidemic?
13. Mention some of the symptoms that occur during the acute stage of the disease.
14. Mention some of the after-effects.

CHAPTER TWENTY-SIX

SOME CHRONIC INFECTIONS

THERE has been within the past few years a great advance in our knowledge of certain chronic diseases like rheumatism, arthritis, and diseases of the heart, kidneys, and arteries ; and many cases of these diseases which a few years ago would have been considered hopelessly incurable are greatly benefited, if not cured, by modern methods of treatment. There is still a difference of opinion among physicians as to the causes of a number of these maladies, but that many diseases besides those listed as acute infectious diseases are caused by bacteria is now an accepted fact. Groups of bacteria may live and grow for long periods in certain tissues and organs of the body, and from these foci of infection bacteria are carried through the body in the blood and settle at different points, causing disease. Because early diagnosis plays an all-important part in the prevention and relief of the disease caused by these bacteria, and because many people fail to consult a physician until important organs have become infected and the disease has materially progressed, I have included this discussion of the subject, hoping to emphasize the necessity of early consultation with a physician in cases of this kind.

Diseases due to chronic infections. Bacteria may live for an indefinite length of time in the tonsils or nasal sinuses ; around the roots of the teeth and in the bones of the jaws and face ; in the appendix and other parts of the intestinal tract ; and in chronic abscesses such as are sometimes found in the lungs or pleural cavities after pneumonia. Among the more or less acute diseases often caused by bacteria from these foci of infection are gastric and intestinal ulcers, rheumatic fever, appendicitis, inflammation of the gall bladder, acute arthritis (inflammation of the joints), and inflammation of the membranes, lining, and covering of the heart.

Among the chronic diseases of which many cases at least are probably caused by this mode of infection are arthritis deformans, chronic nephritis (inflammation of the kidneys), diseases of the walls of the heart, and arteriosclerosis (hardening of the arteries).

Arteriosclerosis. In this disease the thickened and hardened walls of the arteries lose much of their elasticity and the openings in the arteries become narrowed. These conditions increase the work that the heart has to do to force blood through the vessels. At the same time that the heart may be doing this extra work, the muscles of its walls may be weakened and their pumping power lessened because, in the sclerotic condition of the vessels in the walls of the heart itself, the heart muscle fails to receive a good blood supply.

Some of the results of the change in the walls of the arteries are aneurism or sac-like bulgings on the weakened arterial walls; apoplexy, which is due to the bursting of a blood vessel in the brain; diseases of the heart, kidneys, and liver, which are due either to the deficient blood supply these organs receive through the hardened arteries or to the same causes as the disease in the arteries themselves; and a general aging of the tissues and breaking down of the health.

The direct cause of arteriosclerosis is not definitely known. It may have a number of direct or indirect causes. Sometimes it follows attacks of typhoid fever or gout; often it seems to be the result of bacterial products carried from chronic foci of infection within the body. Among the poisons believed to cause it are alcohol and (probably) the excessive use of tobacco. Long-continued hard work and overeating probably help to wear out the arteries, and emotional storms, worry, and mental strain seem to be very definitely connected with degenerative changes in the heart and vessel walls. Some cases of the disease are due to inherited weak vessels, age, or the wear and tear on the arteries incident to daily life; but many cases are due to causes that are within our control.

The first step in treating the disease is to remove the cause. Stop the use of alcohol and tobacco ; remove the focus of infection if one can be found ; reduce the routine of daily living to a normal condition of work and excitement. The walls of the arteries cannot be restored to their normal condition after being damaged, but danger from this condition may be reduced by keeping the bowels open, the skin in good condition by baths, and avoiding overeating, violent exercise, excessive work, worry, and excitement.

Rheumatism or acute rheumatic fever. Rheumatic fever is an acute inflammation of the joints, accompanied by high fever and an excessive amount of pain. It is believed to be caused by a germ brought from some part of the body, often from the tonsils. As a rule more than one joint is affected, but not all at once — a second joint swelling as the first improves. There is complete recovery from the disease, with no stiffness as a result.

The complications following the disease are more dangerous than the disease itself. Of these heart disease is the most serious. Sometimes it is of a form which is apparently light at first but develops later into a serious condition. Chorea (St. Vitus's dance) is a common complication. Tonsillitis, which is frequently present at the same time, is known now to be the cause, not the result, of the attack of rheumatic fever.

In nursing a case of this kind, great care must be taken not to move the bed. Touch the patient gently and only when absolutely necessary ; even unnecessary walking around the room should be avoided. If the weight of the bedclothes gives pain, they should be supported by a frame which can be bought at an instrument store or made of barrel staves cut in half and nailed or tied to strips of wood.

The throat should be treated, and as soon as possible the tonsils removed. Diluted milk diet is given, and water should be drunk in large quantities. Hot and cold compresses may be used to relieve the pain in the joints. The patient should

not be allowed even to sit up in bed until the doctor considers it absolutely safe, as the heart is much affected by the disease

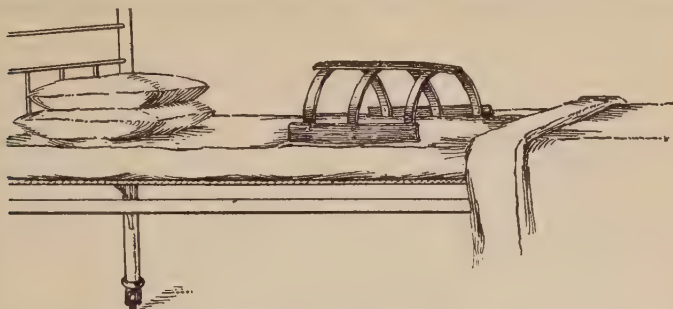


FIG. 59. In cases of illness the weight of the bedclothes is sometimes discomforting to the patient. The figure shows an apparatus made from barrel hoops that can be used to carry the weight of the covers.

and many cases of heart injury can be prevented if proper care is used during convalescence.

Arthritis deformans. This disease is commonly called either *rheumatism* or *rheumatoid arthritis*. Its cause is not surely established, but there is much reason to believe that it is due to germs from some focus of infection such as the teeth, tonsils, infected nasal sinuses, or intestinal infection. The attacks may come on slowly or start suddenly like rheumatic fever. It affects all the joints, large and small. In some cases there is a great deal of pain, in others little or no pain. Gradually the joints stiffen and as a rule increase in size because of the growth of new soft and bony tissue.

For many years little attempt was made even to check the progress of the disease, for nothing was known of its cause. The treatment generally followed was one of diet and medicines, neither of which had an influence over the disease and generally upset the stomach of the patient and made life only so much the harder. Today there is still a great difference of opinion among the members of the medical profession as to treatment, but they agree upon one fact, that sources of infec-

tion must be diligently sought out and removed. If the disease is taken in its early stages and promptly treated, much can be done to check it. Several cases have come under my direct observation in which immense relief was given. One case, a woman over sixty years old, who had suffered from chronic bronchitis for many years and arthritis for eighteen years, had gradually become so crippled that she was obliged to use crutches and never went into the street alone. After two years of massage and forcible exercises, hot-air baking, and injection of vaccines prepared with cultures from her own throat, she was able to give up her crutches and use a cane, and went up and down stairs freely and out on the street alone. Her joints became more flexible and less painful, and her bronchitis was much improved. Other cases of shorter duration have been checked by removal of the tonsils and treating or removing the teeth.

At one time it seemed as if the vaccine treatment was to be the remedy for chronic cases of this disease, but it failed in numerous instances. Now many physicians do not believe in it at all, but feel that the improvement in such cases as the one mentioned above is the result of the treatment of the source of the infection and the general good care and special treatment given to develop the muscles and improve the joints. On the other hand, there are physicians who believe that the disease is due to a specific germ and that by the use of autogenous vaccines (made from bacteria taken from the patient himself) they can benefit their patients. On one point all physicians agree: it is necessary to search for foci of infection and remove any that are found, and the sooner this is done the more sure the result will be. Frequently in the early stages, if the primary colony of germs is broken up, the inflammation at the points of secondary infection will disappear; whereas if the secondary colonies are allowed to become firmly established, removal of the primary one may have little effect. However, those cases which have gone beyond the first stages of the dis-

ease should not abandon all treatments; for though a cure may not be made there is always the possibility that by getting rid of the chief focus of infection the progress of the disease will be checked and some relief from the pain and discomfort will be given. Food has practically no effect upon the disease, and as the appetite is sometimes uncertain with these patients it is best not to limit the variety of their food. Massage and passive and active movements of the joints help to prevent the stiffening of the joints and keep up the tone of the muscles.

Other chronic diseases caused by bacteria. Among other chronic infections may be mentioned Bright's disease, heart disease, and St. Vitus's dance. The latter is believed to be due to the invasion of the central nervous system by germs and the setting up of chronic foci of infection in it. The teeth and tonsils of anyone suffering from this ailment should be examined to see if the primary focus of infection is in these parts.

QUESTIONS

1. What is meant by a focus of infection in the body?
2. Where are foci of infection frequently found?
3. What diseases may be due to these foci of infection?
4. Name some chronic diseases that are probably often caused by focal infection.
5. What is arteriosclerosis, and what are some of its probable causes?
6. What is a frequent cause of rheumatic fever?
7. What complications usually follow this disease?
8. What does the word "arthritis" mean?
9. Describe the usual treatment of chronic arthritis.
10. Why is early treatment of this ailment important?

CHAPTER TWENTY-SEVEN

GENERAL HOME NURSING

WHILE certain cases of illness can best be cared for in the hospital, with all its equipment and appliances, and while in other cases the presence of a trained nurse is necessary if the patient is to receive proper care, yet there are occasions when neither the hospital nor the trained nurse is available and the nursing must be done by members of the family, at home. It is of the greatest importance at such times to know how best to arrange for the comfort of the patient and to administer the treatment that the physician orders. Even when a trained nurse is employed, the more the members of the family understand of her work and its conditions, and the more they are able to do to help her, the greater is the patient's chance of a quick and satisfactory recovery.

In every family, moreover, emergencies arise when everything that anyone in the family knows about illness will prove of value, and when these emergencies come there is no time to learn what is best to be done. The sick room is no place for guesswork or experiment, and unfortunately much of the volunteer services and advice received at these critical times is from persons who may have had some experience but have little knowledge; and experience without common sense and the right kind of information is worse than useless. Therefore, a girl will often find a sound training in the simple principles of nursing invaluable in her own home.

The place for the patient. The first matter to be decided in any case of illness is which room the patient is to occupy. Sometimes, of course, it is necessary to use the patient's own room, but it may be possible to choose another which can be cleared of unnecessary furniture with comparatively little trouble and which will be more desirable. The room should be large and easily ventilated, and if possible should be on a floor

with a bathroom. It should be in as quiet a part of the house as can be chosen, and if it contains a fireplace it will be all the better. The open fire not only gives better ventilation, but affords an easy means of destroying waste, whether infectious or not.

The walls of the room chosen for the patient should be plain in effect, and certainly not covered with large-flowered or gayly decorated paper. Anyone who has been ill in a room with flowered paper is likely to remember the weary hours spent in counting the figures and following the pattern in spite of oneself. Plain plaster or calcimine finish in a soft color is good, and next best is a plain paper or one with a figure so small that it gives the effect of plain paper. If one must prepare walls inexpensively and quickly, the glaring white of a whitewashed wall can be avoided by mixing a little tinting matter such as ocher with the whitewash to make a soft buff or other color. Pictures and ornaments should be either removed altogether or chosen with the absolute certainty that they will not worry the patient. In delirium, pictures and ornaments often seem to take peculiar forms and increase the excitement. Even a very beautiful picture becomes tiresome and irritating to a nervous invalid, when looked at day after day.

A dark room, unless absolutely required by the physician's orders, is not best, especially in the case of a nervous patient. If the bed does not face the window, the shades and windows may be left open, and if the light is too bright, the eyes may be shielded by a screen. The bed should always be placed so that the patient will not face the light. It often serves to increase delirium to have the light shining constantly in one's face. Even when a shade is drawn, the little crack of light shining through beside or under it is irritating to the eyes.

In a long illness, the position of the bed may occasionally be changed, and also the position of the furniture. A small change in the arrangement of a sick room is an event. Monotony may be prevented by changing the pictures and orna-

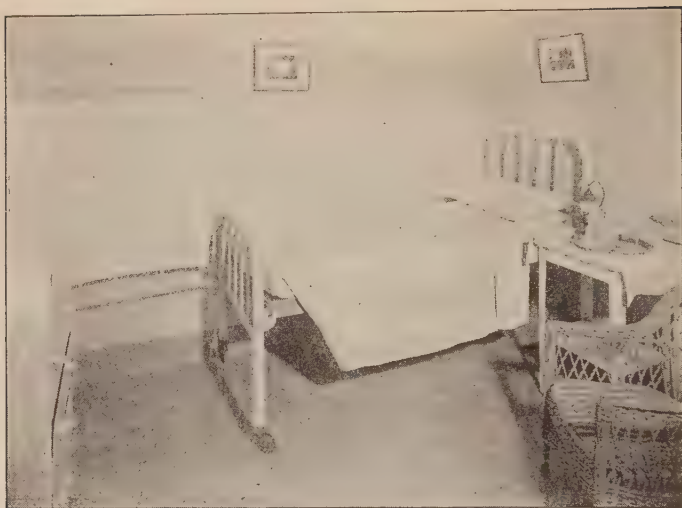


FIG. 60. A room prepared for a sick patient. The walls should be plain, and if the disease is a communicable one, rugs, books, and everything else not needed should be removed from the room.

ments now and then, and a growing plant is a source of interest as it blossoms from day to day.

The one great fact in the psychology of the sick room is that for the time being the patient, like a child, finds little things most important. The wise nurse will avoid "nagging" the patient by asking unnecessary questions or making comments, but will quietly make some little change now and then without remark, and see to it that there is some occupation for the patient's attention aside from watching the sun crawl along the carpet. When the sick room is arranged, if everything not needed is cleared out of it at once, it will not only make the care of the patient much easier but will avoid the fatigue which comes of watching someone day after day in the same round of "tidying up."

Keeping records and charts. Records should be kept from the beginning of an illness. This is really a simple task. All

instrument dealers, and many drug-store proprietors, keep on sale record blanks and temperature charts. Temperature charts are easy to read and simple to keep. They are marked exactly as are thermometers, so that anyone who can read a thermometer can keep a chart. On the record should be noted not only the temperature, pulse, and respiration, but the amount of sleep, the amount of food taken, the excretions, their number and description, and many other facts which enable the doctor to keep up with the case. The more accurate and detailed his information, the more certainly he will be able to judge of the demands of the case. A physician sometimes finds after days of fever that the temperature has been recorded, if recorded at all, on little, undated scraps of paper, and if he cannot know on what day of the disease the temperature has been taken it seriously interferes with his interpretation of the symptoms.

The doctor's orders. Always carry out the doctor's orders absolutely. If an order is not clearly understood, ask the doctor to explain it before he leaves the house. Any physician would rather be asked two or three times for further explanation, than to come back and find that his orders have not been carried out because they have not been understood. It occasionally happens that the physician or nurse in charge of a case, in leaving the untrained home nurse in charge, takes it for granted that she knows something she does not know, or that she is capable of dealing with certain situations with which she has had no experience. In that case the home nurse should ask questions, and make sure that she thoroughly understands the matter before she takes the responsibility. Any trained worker is only too glad under such circumstances to explain to a willing but inexperienced helper.

Regularity in giving food and medicines. Food and medicines must be prepared and given exactly when ordered. Medicines must be measured accurately, and be ready on the

moment. Food must be ready to serve at the time when it is to be given, and even a little before. Delay in giving a medicine, or fifteen or twenty minutes' delay in a meal, has been known to cause serious loss to the patient through weakness. Amateur nurses sometimes wait to begin their preparations until the hour of the meal, and even remark that they must go down and see about the patient's tray, leaving the patient to wait, as it seems, an indefinitely long time for the food. In preparing food, the nurse should have her mind made up early what she will give at the next meal, and how long it will take to prepare it, and all the essentials should be got ready beforehand. She should know how long the immediate preparation will take, and begin in time — not wait until ten or fifteen minutes before the hour to begin, and try to make up the time by hurrying.

Care of the sick room. In the case of a communicable disease, all wastes that can be burned should be so destroyed in the fireplace, if there is one. In sweeping the room, dust should be avoided as far as possible. The floor can be wiped with a floor mop, and the furniture with a lightly oiled cloth. Everything that is soiled should be removed and cleaned at the earliest practicable moment.

Watching and measuring the excreta. Watch the urine and bowel discharges, and all expectorations or other excretions. Urine should be measured, and no bedpan should be emptied without thorough examination. The physician is often warned of some trouble from the condition of the urine or feces. If, when emptying a bedpan, there is anything unusual in the appearance of the contents, they should be saved and shown to the physician. It is better to save specimens unnecessarily several times, than to throw out one which might have indicated danger. As has been pointed out (page 245), in some diseases, particularly typhoid fever, hemorrhage will show in the excretions of the bowels. The untrained eye may fail to recognize blood in this case, because when it comes from high

in the intestine it is brown and not red, but the physician recognizes it at once.

Etiquette of the sick room. Never whisper in the room of a patient. If anything must be said which is not to be heard there, go quite away. Nothing is more exciting or annoying to a nervous patient than the sound of whispering. She imagines that she is dying, that some secret is kept from her, that things are going on in the family which she is not to know, and even when she really knows that nothing is the matter she cannot help these worrying fancies. If it is necessary to talk in the sick room, speak so that the patient can hear easily. Of course, if she is sleeping, you will not speak in the room at all. Do not whisper outside the door or in the hall. Go quite away to do any talking that must be done.

If it is necessary to make a report to the physician, go out of the room to do so. It is an excellent plan to make a habit of following the physician to the door, whether there is anything to report or not, so that the patient, being accustomed to this as a part of the routine, will not become uneasy when there really is reason for consultation. Some doctors arrange to have the nurse go out of the room with them at each visit, when often all that is said will be: "Anything new today?" "No, nothing, Doctor." "All right." This gives the opportunity for any necessary report and instructions without making anything unusual of it.

Cheerfulness in the sick room. A cheerful manner and face — not determinedly hilarious, but serene and unworried — will be of great help to the patient's courage in fighting against the illness. The nurse should also take care that those who are allowed to visit the patient do not stay too long or become tiresome. Care must often be taken that those who visit the sick room do not tell stories of similar illnesses. The things which are done in this way seem almost incredible. In one household where my patient was suffering from a mild case of typhoid, I was relieved by a nurse of experience. Every after-

noon after my period of rest I found the patient worse, either terribly excited or so depressed, mentally and physically, that it was some time before I could restore her to the condition in which I left her. I was certain that something which took place in my absence caused the change, but neither the physician nor I could find out what it was. At last I suggested that I should take the entire charge of the case, getting what sleep I could while my patient slept. This change having been made, there was a steady improvement, with no further trouble during the afternoon. When the patient was convalescent, she told me that the "nurse" relieving me had told her many tales of people who had become permanently insane from the effects of typhoid fever, and described to her graphically the deathbed scenes which she had witnessed in her experience with this disease!

Another case in my experience was that of a young mother who, after losing her baby at birth and practically reaching convalescence, began suddenly to run such a high temperature that typhoid fever was feared. I was put in charge of the case, with orders to admit no one else to the sick room. After a few days of quiet and care the temperature went down. During this time she was constantly asking whether it was her fault that her baby did not live, whether it was true that she would never have a baby that would live, and other similar questions. At last she explained that two or three of her visitors had told her such dreadful things that she could not get them out of her head, and in her bodily weakness this rise of temperature had been the result.

In another case, where there was persistent, unexplained pain, and a secret fear of cancer, the patient had heard from one person admitted to her room tales of many cancer cases occurring after just such pain as hers and just such difficulty as the doctor was having in the study of the case. Many otherwise intelligent persons seem to take delight in telling such tales, especially when they can pour them into the ears of

patients suffering from ailments similar to those of which they have heard. Any doctor will support the nurse in turning such visitors out of the room.

QUESTIONS

1. What is the first thing to be attended to in preparing to take care of a patient through a long illness?
2. Mention some conditions which it is desirable to have in the patient's room.
3. What type of bed is best, and how should it be placed?
4. Why is it desirable to change the position of a bed during a long illness?
5. Describe the type of charts and records which should be kept during an illness.
6. How is it best to have the doctor give his orders?
7. Give reasons why regularity should be the rule in giving medicines and food.
8. When should excreta be saved for examination by the doctor?
9. Give general rules for etiquette in the sick room.
10. How long should visitors be allowed to stay?

CHAPTER TWENTY-EIGHT

NURSING COMMUNICABLE DISEASES

IN nursing non-communicable diseases the nurse thinks only of the welfare of the patient. In nursing a communicable disease she has the double task of caring for the patient and of keeping the infection from spreading to herself and others. In this chapter I shall give some general instructions that apply in nursing cases of most communicable diseases, and in subsequent chapters shall discuss in more detail particular problems that arise in connection with some of the more important of these diseases. Since a large proportion of the illness that comes into the ordinary home is due to communicable diseases of one kind or another, a knowledge of them will prove most valuable to the amateur nurse in her home.

Making isolation effective. Isolation which is not complete is not really isolation, for a chain is no stronger than its weakest link. It is important, therefore, that in case of a communicable disease the sick room should be separated as far as possible from those used by other members of the family. When practicable, the best arrangement is two rooms and a bath on the top floor. It is most desirable that a bathroom should be reserved for the use of the patient and the nurse, but of course, in a house where there is only one bathroom, this is out of the question. In such circumstances the nurse should use every means in her power to avoid contaminating the bathroom with the germs. She should not set a vessel on the floor of the bathroom, and should touch nothing in the room without disinfecting her hands. She may use a piece of soft paper between her hand and the faucets and door knobs. The room chosen for the patient should be easy to ventilate, and if possible should have a fireplace. The fireplace not only aids in ventilation, but affords a convenient way of destroying paper and pieces of linen or gauze which have been used in the care of the patient.

The nurse in charge of the case should not go into other parts of the house, or mingle with other members of the family. She should stay in the sick room except when she leaves it for her daily walk. She should keep outside the room a complete suit of outdoor clothing, even to shoes, and change to this when going for her walk, and she should pass directly out without stopping to talk with members of the household.

The same precautions should be taken by any member of the family, or any friend, who may be called on to relieve the person in charge of the case. The hair should be covered while in the sick room, and washed afterward, for safety. No letters should be sent from the sick room unless they are disinfected. After leaving the case the nurse should immediately disinfect herself and wash her hair, before entering street cars or stores.

Preparation of the sick room. Remove from the room all unnecessary rugs, ornaments, pictures, and books. Clean out the closets thoroughly and take out of them all unnecessary contents, especially woolen clothes and books. In selecting the furniture for the room, choose the most simple and the most easily disinfected. In many diseases, as in scarlet fever and diphtheria, it is necessary to wash off the beds with disinfectants. A brass bed is injured by water, while a wooden bed, or better still an iron bed, can be washed and thoroughly disinfected. The preparation of the room is often left to the members of the family, for by the time the nurse reaches a case the patient has frequently been in the room so long that it is impossible to remove the things left in it.

Disinfection during the disease. Floors and furniture in the sick room should be wiped with a damp cloth. Dishes used should be thoroughly disinfected before being taken from the room, and should be kept separate from those used by the family. All food left by the patient on the plates should be destroyed. If there is a fireplace in the room, the surplus food should be burned ; if not, it should be left to stand in a disin-

fectant, after which it may be safely taken from the room. A wooden tub filled with disinfectant solution should be kept outside the door, where a maid or a member of the family can get at it. Into this the nurse should put the dishes, which, after having stood in the solution for at least an hour, can be taken away by the maid. When this is done, the nurse does not have to touch them after they are disinfected.

The same means can be used in disinfecting clothes ; or they may be wrapped in a sheet wet with a disinfecting solution, carried to the laundry, and boiled. Everything that touches the patient or the bed should be disinfected. The solution to use for clothes, except in a case of infantile paralysis, is carbolic acid (5 per cent) or formalin (10 per cent). The nurse's clothes also should be disinfected.

As it is no longer believed that the germs of such diseases as scarlet fever and diphtheria can be carried through the air or in dust, hanging a wet sheet over the door is not thought necessary. Infection is most commonly conveyed by direct contact with the patient or something touched by the patient, such as bedclothes or dishes. The nurse may convey infection in working over the patient, touching the body with her hands or clothes, or soiling them with excreta containing germs. But if the proper disinfecting of all dangerous materials has been done, and if the nurse has been properly careful in carrying excreta from the room, the furniture and rugs on the opposite side of the room from the patient will be only slightly contaminated at most, and the few germs on them will be destroyed by fresh air and sunshine.

Disinfecting excreta. All such excreta as stools, urine, and sputum should be disinfected. Sputum can be received in old linen, paper napkins, or paper cups, and burned. In a room where there is no fireplace and the cloths or cups must be carried out of the room to be burned, the nurse should wrap them in a newspaper. Some member of the family may receive the bundle from her, not touching it with the hands but folding it in

fresh paper and carrying it down to be burned in the furnace or range.

Fecal discharges may be disinfected with 5 per cent carbolic acid, cresol (one part to four parts of water), formalin (10 per cent), or chlorid of lime. The excreta should be thoroughly covered with the solution, the masses broken up, and the solution stirred into it, and it should stand for at least an hour in a covered vessel. If the disinfectant is applied hot, it will penetrate more thoroughly.

Protection for the nurse. A nurse must invariably disinfect her hands after working with the patient, both for her own sake and to prevent the spread of germs through the room. She should keep ready a bowl containing a disinfectant, and after working over the patient or coming in contact with the bed or the person, should go at once, before touching anything else in the room, and disinfect her hands. When the disease is one of the throat or lungs, she should constantly use a gargle and mouth wash. If the disease is diphtheria or scarlet fever, she should be given antitoxin, unless she is already immune. If she is caring for a case of smallpox, she should be vaccinated; if the patient has typhoid fever, the nurse should be made immune by inoculation. She should eat nothing that has been standing in her own room, and should not eat in the room where the patient is. Before beginning to eat, she should wash out her mouth and throat, and bathe her hands, face, and arms in a disinfectant. In working over the patient she should not allow the breath of the sick person to come in her face. One of the great dangers in diphtheria is that the patient may cough in the face of the nurse while she is spraying or treating the throat or while she is leaning over the bed. At such times the nurse should wear a mask of fine gauze.

Daily care of the patient. The patient should be bathed once or twice daily. Unless the skin is inflamed, alcohol may be added to the water. In cases where there is desquamation (scaling), as in scarlet fever and measles, it is well to rub the

body with carbolated vaselin before the bath. The vaselin not only relieves the itching, but keeps the particles of skin from flying about. The mouth and tongue should be cleaned thoroughly twice a day, and oftener if there is excessive fever. A mouth wash of glycerin, boric acid, listerin, and water will help to keep fissures from forming on the tongue. Vaseline should be put on the lips if there is a tendency to dryness. The ears should be watched for discharge, and if there is discharge or any apparent deafness it should be reported to the doctor. Urine should be measured and its character noted. The back should be rubbed twice daily to prevent sores. The eyes should be shielded from the light and, if they become inflamed, should be washed out with a saturated solution of boric acid. The patient should not be left alone, for there is often great prostration and, in most communicable diseases, danger of heart failure.

Complications. In all infectious diseases certain complications peculiar to the disease must be guarded against, and their prevention depends in the main upon careful nursing. Even in mild attacks, unfailing care and attention are needed. The nurse should keep her eyes constantly open for new symptoms and report every unusual condition to the physician. She should inform herself at the outset as to the complications most likely to occur, and the best means for preventing them. Sometimes the best efforts cannot keep these complications from developing, but in the majority of cases intelligent and faithful care will do the work. In later chapters some of the complications to be looked for in some important diseases will be pointed out.

QUESTIONS

1. How is isolation best carried out?
2. Describe the preparation of a room in which a patient suffering from a communicable disease is to be isolated.
3. What care should be taken of the patient's dishes?
4. How are sheets and bedclothing disinfected?

5. How may excreta be disinfected?
6. Mention some of the precautions that anyone nursing a communicable disease should take for her own protection.
7. How can a nurse be protected from diphtheria? scarlet fever? typhoid fever?
8. What should a nurse do to prevent the complications which frequently follow attacks of infectious diseases?

CHAPTER TWENTY-NINE

TEMPERATURE, PULSE, AND RESPIRATION

DURING illness the production and control of the body heat, the beating of the heart, and the respiration are usually disturbed, and often in a case of sickness much information as to the nature or progress of the disease can be gained by watching its effects on these fundamental processes of the body. It is necessary, therefore, in almost all cases of illness, to take the temperature and count the pulse and respiration, and the amateur nurse must understand just how this is done.

Taking the temperature. For taking the body temperature we use what is called a *clinical thermometer*, a small, slender glass thermometer which will go easily under the tongue, slip into the rectum, or lie between two folds of the body. This thermometer must be disinfected both before and after using. A piece of absorbent cotton wet in grain alcohol is as a rule used for cleaning the thermometer, as this both washes and disinfects. If a thermometer is constantly in use, it is frequently kept in a glass of mild, non-poisonous solution such as boric acid. This is not necessary, however; for if the thermometer is thoroughly cleaned after use, it can be put back into its case. Washing it under a faucet is not sufficient.

Before using the thermometer we must be sure that the mercury in it is properly settled; for when the mercury is once up in a clinical thermometer, it will not come down of itself as it does in an ordinary thermometer. The best way to shake the mercury down is to take hold of the upper end of the thermometer and give it a quick, jerking swing. The temperature is registered in from one to five minutes, depending upon the part of the body in which it is taken.

The usual places for taking the temperature are (1) under the tongue, the tongue being held well down and the lips

closed ; (2) under the arm, in the groin, or in some fold of the body ; or (3) in the case of infants or delirious patients, in the rectum.

In taking the temperature in the mouth, which is the most usual way, we must be careful to see that the mouth is not too dry and that the patient has not just taken either hot or cold fluids. If the mouth is dry or hot, it is well to rinse it out and wait for ten minutes before inserting the thermometer. In taking the temperature under the arm, we must be sure that the armpit is dry and that the thermometer lies between the folds of the skin, not touching the garment, and also that the arm is placed close against the side of the body. In taking it in the rectum, the thermometer should be oiled ; and, of course, a thermometer kept especially for the purpose should be used in taking the rectal temperature.

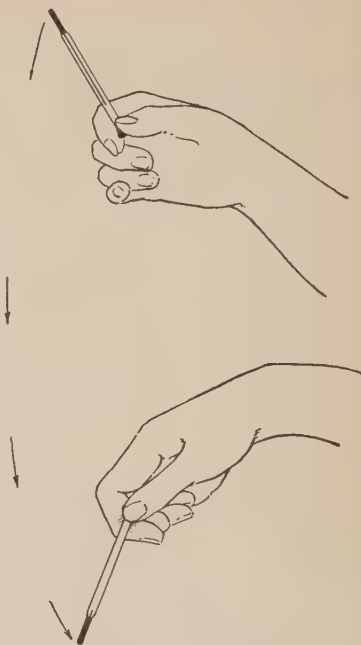


FIG. 62. Shaking down a clinical thermometer.

Differences in the temperature of different parts of the body. The temperatures of the different parts of the body are not exactly the same. The axillary or armpit temperature is $\frac{1}{2}^{\circ}$ lower than that of the mouth, and as the thermometer records more slowly under the arm it should be kept there from five to ten minutes. The rectal temperature is $\frac{1}{2}^{\circ}$ higher than the mouth temperature. In interpreting the record on a temperature chart, we understand that a mouth temperature has been

taken unless the contrary is indicated. If it has been taken either in the axilla or the rectum, that fact must be noted on the chart. If such an entry should be made and not properly indicated, the chart would not be accurate, as the temperature would be either higher or lower than it would have been if taken in the mouth, and the reader of the chart would have no sure guide as to its exact meaning.

Variations in temperature. The normal temperature is 98.4° F.; 96.5° to 98° is subnormal; 96.5° indicates collapse; subfebrile is 99.5° to 100.5° ; moderate fever is indicated by 100.5° to 100.7° in the morning and 102° to 103° in the evening; high fever, 102° to 104° in the morning and 104° to 105° in the evening; 105° to 110° means intense fever.

For mild cases of fever it is customary to take the temperature twice daily at intervals of from ten to twelve hours. That is, if it has been taken at 8 A.M. it should be taken again at 8 P.M. The temperature is lower in the morning than in the evening.

Accuracy in taking temperatures. We must be absolutely sure that we take the temperature accurately. If it varies greatly from the last time, the thermometer should be shaken down and the temperature taken again. Any sudden change in the midst of an illness is an indication of trouble and should be reported immediately.

Fever above 105° , if long continued, will leave the patient in a critical condition. Occasionally the temperature may run up excessively high, as in a sunstroke, and sometimes in fever or nervousness, and the patient still live; but if such temperature continues long, death will be the result.

Excessively low temperature usually indicates heart weakness, and sometimes this condition continues for weeks in cases of chronic heart or kidney diseases. Under all other circumstances a low temperature should be considered as indicating collapse, particularly when coming in the midst of an attack of typhoid fever or other acute disease.

End of fever. Fever ends in two ways, by *crisis* and by *lysis*. Crisis means a sudden change, and lysis a slow change. For instance, in typhoid fever we say that the temperature ends by lysis — there is a gradual trend of the temperature downward. It continues to range much higher in the evening than in the morning, but at the same time each day's record of temperature is lower than that of the day before. Pneumonia is an example of a fever that usually ends by crisis; after the seventh or ninth day, the temperature may drop from 103° or 104° to 97° or 98° (page 244). Although this is the normal way for pneumonia to end, the patient must be carefully watched and, when the temperature suddenly drops, stimulated with heat or medicine to prevent heart failure.

The pulse. The pulse indicates the rapidity of the heart beat, and the physician or nurse can learn a great deal by feeling it. The inexperienced person, however, is able to judge only of the rapidity or the slowness, and the strength or the weakness, of the beat. The normal pulse in a man is from 60 to 70 beats a minute; in a woman, from 65 to 80 beats; and in a child, from 90 to 100 beats. But there are many individuals whose pulse rate will fall outside these limits.

Methods of taking the pulse. The pulse is taken by placing the finger ends along the course of an artery near the surface of the body and counting the beats for one minute. For a person of little experience it is best to take the pulse twice and to take it two minutes, to insure greater accuracy. It is generally taken at the wrist, from the artery which comes near the surface there on the thumb side; but it can be taken wherever it is possible to feel an artery — for example, at either side of the throat, on the artery in front of the ear, on the side of the chin, or on the inner side of the ankle. In giving an anæsthetic, it is customary for the anæsthetizer to keep his finger on the artery in front of the ear, that he may detect instantly a change in the heart beat.

In taking the pulse the thumb is never used. There is an artery in it near the surface, and the nurse may count the pulse in this instead of in the wrist of the patient.

Variations in the pulse rate. The pulse rate varies according to age; the old have a much slower pulse than the young. A sudden movement will change the rates, particularly if there is any weakness in the body. So, in taking the pulse of a sick person, if it is excessively high we must always consider whether the patient has been quiet or whether there has been any sudden movement. Excitement will increase the heart beat; so will going up steps or going fast on a level. It is more rapid when one is standing than when one is lying.

There are many other facts that have to be noticed concerning the pulse besides its rapidity. Among these may be mentioned its rhythm — whether it is regular or irregular in force and frequency; whether it is intermittent, missing a beat now and then; or whether it is large and bounding or small and feeble. One must observe also the condition of the radial artery — whether it is compressible as it is in the normal condition, or hard as it is when the blood pressure is high.

Respiration. The normal respiration is from 18 to 24 breaths per minute. It is very hard to get the normal respiration when the patient is conscious that it is being taken, because the respiratory movements are voluntary as well as involuntary and their rhythm can be changed at will. A nervous or hysterical patient will either decrease or increase her respiration if she is conscious that it is being taken. For this reason the nurse has to resort to many tricks to make sure that the normal breathing rate has been recorded. The custom is to lay the arm across the chest and, on the pretense of counting the pulse, first take the respiration.

Sometimes it is necessary to finish taking the temperature and pulse and count the respiration when the patient is not conscious of your watching her. The facts to be noted about respiration are its rapidity, its regularity or irregularity,

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FIG. 63. After pulling the sheet until it is tight over the end of the mattress, lay it smoothly along the side.

folded under part of the sheet firmly toward you until it is smooth and straight under the mattress.

(4) Take hold of that part of the sheet which is a continuation of the part covering the end of the mattress, and after pulling the sheet until it is tight over the end of the mattress, lay it smoothly along the side. The part of the sheet lying against the side of the mattress should be a direct continuation of the part covering the end of the mattress.

(5) Tuck the part of the sheet which falls below this well under the mattress.

called the "envelope corner." It is neat in appearance and holds the sheet firmly in place. The lower sheet is placed on the bed and the corners secured in the following way :

(1) Spread the sheet straight upon the bed. If it is not straight, it will pull into wrinkles and will not stay in place.

(2) Tuck the sheet well under the mattress at the top.

(3) Then, catching hold of it at the side, pull the



FIG. 64. Tuck the lower part well under the mattress.

(6) Still holding the sheet firmly against the side of the mattress, bring the part above over and tuck it under the mattress. If correctly and smoothly done, the sheet should form a diagonal fold at the corner of the mattress (Fig. 66).

(7) After folding and tucking in the two ends of the sheet in this way, push the sides of the sheets under as far as they will go.

The farther under the mattress the sheet is, the less likely it is to wrinkle.

The top sheet is put on in a similar way, but with the wrong side up, so that the hem when turned over will be right side out; the broad hem in both sheets is of course at the top. The top sheet is pulled down well at the foot, and not tucked in at the side as far as the upper sheet, so that opening the bed will not loosen the lower sheet.

Rubber sheets and draw sheets. Rubber and draw sheets are used for a bed patient. For ordinary cases a small rubber sheet is sufficient. This goes over the linen sheet, and must extend from at least the waist line of the patient down almost to her feet and be wide enough to tuck well under the mattress at the sides. It is not a good plan to pin the rubber sheet to the mattress with safety pins, as the weight and movements of the patient are apt to tear it at the places where it is pinned.

For a case of typhoid fever, or where there is inability to retain urine or feces, it is better to have a rubber sheet over the whole mattress, as well as the narrow one over the bottom sheet. Large rubber sheets are made with reinforced holes at



FIG. 65. Still holding the sheet firmly against the side of the mattress, bring the part above over and tuck it under the mattress.

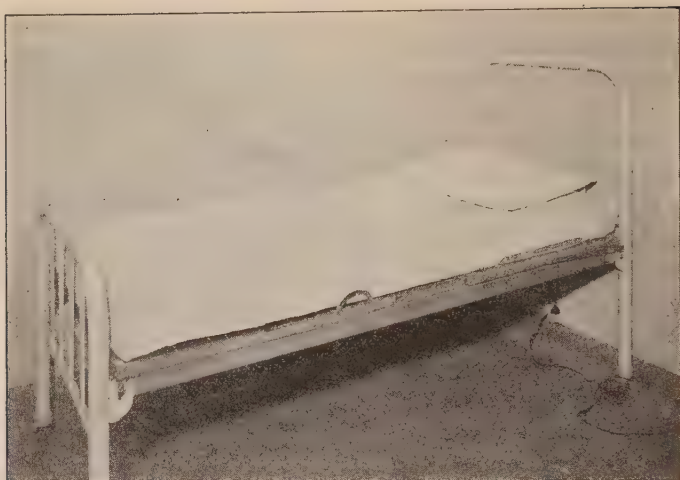


FIG. 66. If the work is correctly and smoothly done, the sheet should form a diagonal fold at the corner of the mattress.

the sides and ends into which tapes can be run and the sheet fastened to the frame of the bed.

The draw sheet is drawn crosswise on the bed over the small rubber sheet. It should be wide enough completely to cover the small rubber one, and is useful (1) to cover the rubber sheet; (2) to protect the bottom sheet in the part where it is most likely to be soiled; (3) because it is easy to change; (4) because it is easier to wash than the large sheet; (5) because it can be easily and quickly tightened and smoothed under the patient.

Changing the sheets with the patient in the bed. There are several methods of changing the sheets on the bed while the patient is lying in it. The method to be used in any given case depends on the condition of the patient and the preference of the nurse. The following is a satisfactory way, when the patient can be turned:

- (1) Put her on her side, with her back toward you.
- (2) Remove the heavy top covers, leaving in winter just



FIG. 67. Push both the soiled sheet and the folds of the clean sheet close to the back of the patient and turn her over to the side of the bed covered with the clean sheet.

enough light blankets or comfortables to keep your patient from being chilled.

(3) Loosen the bottom sheet at the side from which you work, at both the foot and the head of the bed. Then either lay it in folds or gather it loosely together, and push it up close to the patient.

(4) On a couch or table (not on the bed of your patient) lay the fresh sheet in long, smooth folds, leaving one side unfolded to be tucked under the edge of the mattress.

(5) Lay the fresh sheet on the mattress and tuck in the unfolded side the whole length of the bed.

(6) Push the folds of the sheet close to the back of the patient and turn the patient over with her face to the side of the bed covered by the clean sheet. Then go to the other side of the bed, where the soiled and the clean sheet will both be at the back of the patient.

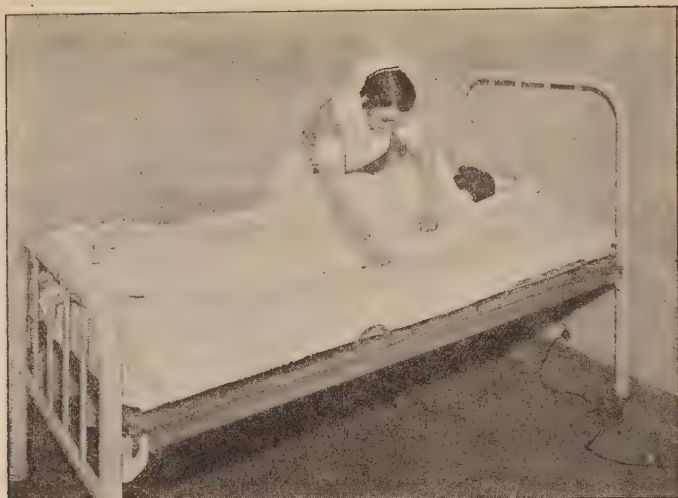


FIG. 68. The soiled sheet and the clean sheet will be found at the back of the patient.

The soiled sheet can then be easily removed and the clean one drawn over, tucked in, and the corners secured. The draw and rubber sheets can be changed by the same method at the same time as the large sheet if necessary, by rolling them up with the soiled sheets and laying the clean draw and rubber sheets on top of the clean bottom sheet.

With a helpless patient it is easier to change either from the head or the foot of the bed. I have found working from the foot of the bed the best plan, as it is easier to reach over the bedstead at the foot than at the head. The patient is also much less disturbed in the first part of the preparation, when one works about the feet. In this case the steps are as follows:

(1) Loosen the bottom sheet as before and push it up from the bottom.

(2) Fold the clean sheet crosswise instead of lengthwise as before, and tuck it in at the foot of the bed. Be sure to leave enough length to reach well to the head of the bed.



FIG. 69. Changing the sheet from the bottom of the bed.

(3) Lift the feet and push up both sheets; then lift the legs and work the sheets farther upward. If the patient is strong enough, bend her knees and let her help raise her buttocks.

(4) After this put your arm around her and raise her shoulders and head, pull the pillows out, and bring up the two sheets. Remove the soiled one, replace the pillow, and lay your patient down.

(5) Tuck the top of the sheet under the mattress and fix the corners.

When changing from the head, this order is reversed. If a patient is unconscious and absolutely helpless, a second person should help; then, with one person on each side of the bed, the sheets can be drawn along and the patient lifted with little trouble to the nurse and much less fatigue to the patient.

To change the upper sheet, lay it over the top of the soiled sheet, and in winter over the top also of a small blanket, taking care not to fan the air over the patient with the sheet. If the

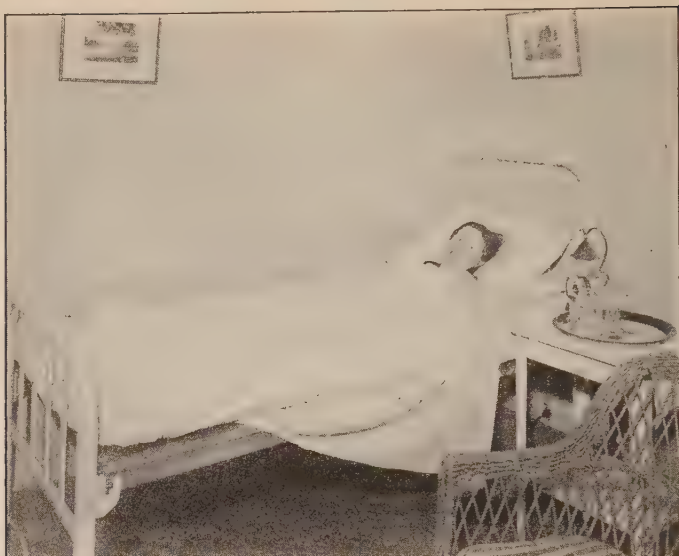


FIG. 70. The covers should not be pulled down too tight. Room should be left for the patient's feet.

patient is not too weak to help, let her hold the top of the clean sheet as you slip the other from under it. If the patient is too weak to assist, tuck the corners of the clean sheet under her shoulders, then carefully remove the soiled one.

Lifting and moving a patient in bed. When lifting a patient to turn her pillow or to adjust the sheet or gown, stand on the right side of the bed and let her put her arms around your neck. Then put your left arm around and under her shoulder, leaving your right arm free for the work. To move her to the side of the bed, slip your arms under her shoulder and hips and draw her toward you.

Changing the nightgown. If the patient is to be kept in bed for a long time, it is much better to split the nightgown in the back. It is then easier to change, and as the patient does not lie on it, it is less quickly soiled. Also it makes one thing less to



FIG. 71. Lifting a patient in the bed.

keep smooth under the back. If split to the neckband or yoke, it is easily put on and is still held in place. When removing a nightgown, if it has not been split, draw the skirt of the gown well up from under the buttocks, draw one sleeve off, and lift the gown over the patient's head; then slip off the second sleeve. In putting on the fresh gown, the order is reversed: put one sleeve on, put the gown over the patient's head, put the second sleeve on, then pull the gown down under the patient. If the patient is weak, put your hand through the bottom of the sleeve and, catching hold of her hand, pull it through the sleeve.

Changing the mattress. A nurse should never attempt to change a mattress on which a patient is lying, without adequate help. The mattresses must be carefully held lest the patient have a fall, and this requires the aid of several persons. The easiest way to move a patient from one mattress to another is to lift her to one side of the mattress upon which she is lying, pull it half off the bed, put the fresh mattress on the

uncovered half of the bed and close to the first mattress, and then draw the sheet on which the patient is lying over on the fresh mattress.

To turn the mattress over, pull it one half off the bed in the same way, place pillows on the empty side of the bed and move the patient over on to them; turn the mattress and move the patient back. This should not be done to a weak or nervous patient, as the fear of falling is much greater if pillows are used instead of mattresses.

Changing from one bed to another. This should not be undertaken without plenty of help. Each person should understand clearly, before beginning, the precise duties assigned to her and attend strictly to these. Failing to hold the beds steady or letting go of the patient might mean a fall and possible injury.

If the beds are of even or almost even height, they should be placed together side by side. The patient is then moved to the edge of the mattress nearest the second bed, and the mattress on which the patient is lying is drawn partly off in the direction away from the second bed. The mattress of the second bed is then brought over until half of it rests on the first bed. The two beds must be held closely together and the mattresses firmly supported while this is being done. The patient is then drawn, on a sheet or strong bed pad, over on to the second mattress and slid back in place on the fresh bed. If this is done quietly and carefully, each one attending to her own task, there need be no strain or nervous excitement on the patient's part.

If the beds are of unequal height and the patient must be lifted, place the beds side by side but with the head of one bed near the foot of the other, leaving a triangular space between the beds large enough to permit the nurses to turn around. Then the nurse, with two or three assistants, must go in between the beds, slip their hands and arms under the head and shoulders and back and legs of the patient, lift her, and then turn around and lay her in the fresh bed.

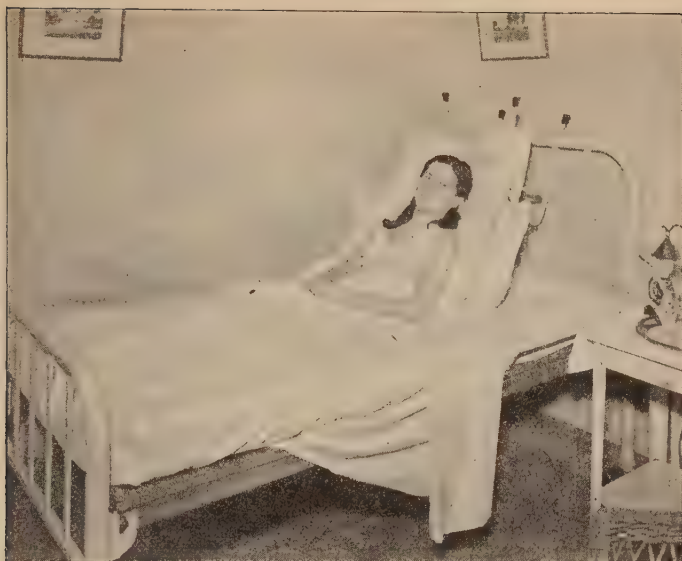


FIG. 72. A chair used as a bed rest.

Arranging pillows. Every person has some individual way of arranging pillows, and a nurse should learn to stick them up, flatten them down, or place them in whatever way the patient prefers them. Much can be done with small pillows to make the patient comfortable. Placing one under the abdomen when lying on the side will often relieve abdominal pain. Pillows under the knees, of different heights, will relieve the strain when lying on the back. A pillow under the feet, or between the feet and the foot of the bed, will keep the patient from slipping down in bed and will prove restful to her. Pillows may be put under the elbows, under the hollow in the back, and in fact almost anywhere that support is needed. Sometimes, when a patient cannot turn, the nurse's hand can be run under one shoulder or side, the patient lifted slightly and a little pillow tucked under the side. A good nurse is one who not only knows how to give medicines and wait on the doctor, but who

also remembers the little things that can be done to relieve the strain and nervousness of the patient.

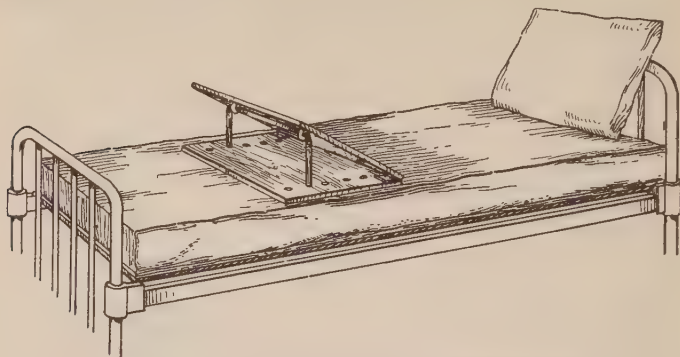


FIG. 73. A bed support to keep a patient from slipping down in bed.

Bed rests. Bed rests can be bought to support a patient who is sitting up in bed, but as a substitute a small, straight chair may be used. The chair is turned upside down on the bed, the back of the chair forming an incline to hold the pillows. One often slips down in bed, and this can be prevented by placing a pillow under the knees. To keep this pillow from slipping, double it over a small rope or twisted sheet and tie the ends of the rope or sheet to the sides or top of the bed frame. Small bed supports resembling little seats can be made in two ways: (1) Two boards with edges beveled on one side are fastened together with hinges. Two iron supports swinging

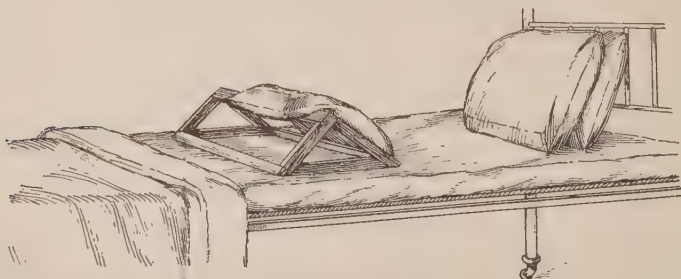


FIG. 74. Another type of bed support that can easily be made at home.

from the top and fitting into holes in each side of the lower board make it possible to adjust the seat (Fig. 73). (2) A frame to support the patient may be made as is shown in Figure 74. Either of these supports should be covered with a pillow when in use and must be tied with cords to the frame at the side, or, with a heavy patient, to the head of the bed.

QUESTIONS

1. Give in detail the steps for making a bed as it is done in hospitals.
2. Why are rubber and draw sheets used?
3. Starting from the side, how would you change the sheets under a helpless patient?
4. Describe the method used in changing the sheets from the head or the foot of the bed.
5. How would you change the nightgown of a helpless patient?
6. What is the easiest method of lifting a patient to turn her pillows?
7. How can a second mattress be substituted for the one under a helpless patient?
8. How may a patient be changed from one bed to another?
9. Describe easily made bed rests.

CHAPTER THIRTY-ONE

BATHING A PATIENT IN BED

THE morning bath should be given each day about an hour after breakfast. While the patient rests after eating, the nurse should be preparing everything needed for the bath. In this, as in other matters connected with the care of the sick, no good nurse will ever be obliged to stop what she is doing in order to get something forgotten in the preparations. It is well for the inexperienced nurse to make out a list of what will be needed, and to refer to this until she is so accustomed to the work that the list is no longer required. In making out the list, put down the things to be done in the order in which they will be done; time yourself and see how quickly the preparations can be made.

Preparations for the bath. The following preparations should be made before the giving of the bath is begun:

(1) See to it that the temperature of the room is between 72° and 75° F.

(2) Put sheets to air, and, in winter, to warm.

(3) Put nightgown to warm.

(4) Have ready the following articles:

2 single blankets, warmed

1 face towel

2 or 3 bath towels

2 wash cloths

Soap

Grain alcohol

Tub or large bowl

Slop jar or pail

Low table, stool, or chair for bowl

Hot and cold water

Administering the bath. When everything is ready, put one blanket under the patient in the same way in which the lower sheet is changed. Put the second blanket over the patient and remove the nightgown. Begin by bathing the face and ears. Go over the body in this order: face, ears, neck, arms, chest and abdomen, feet and legs; then turn the patient on her side and wash her back, and while she is in this position rub the back

and shoulders with alcohol. Then turn the patient on her back again and wash the pubic region.

Be careful not to uncover at one time more of the body than is absolutely necessary. Wash, dry thoroughly, and cover each part before going on to the next. Don't be afraid to wet your patient, but at the same time be careful not to have the cloth so wet that it will drip over the blanket and towels. Use bath towels to keep the blankets dry, laying them between the part to be washed and the blankets. In cold weather, or if the patient is very sensitive to the air, the whole bath may be given under the blankets, protecting them above and below with the towels. The water in the bowl should be changed at least twice — once after bathing the trunk, and again after bathing the feet and legs. If the patient is not too weak, put the hands and feet into the bowl, as this is very refreshing. For the feet, the bowl is set on the bed and steadied carefully, and the feet lifted and put into the bowl, one foot at a time. If the patient is able to help herself, use a foot tub and put in both feet. When using the tub on the bed, it is best to protect the bed with a rubber sheet covered with a bath towel.

Dry the patient carefully, grasping the towel firmly, so that it will not merely slip over the skin. Wipe thoroughly between the fingers and toes and in the folds of the body. If the patient seems tired after her bath, leave her between the blankets while you set the room in order; then remove the blankets and put on the nightgown.

It is well to have a regular order for the morning's work. At the same time, never lose sight of the fact that what is being done is for the health and comfort of the patient. If she is tired or nervous, it is better to leave the combing of the hair or the cleaning of the teeth until later in the day. Do not insist on a fixed routine regardless of her feelings or strength. If she is not really weakened, but merely peevish, a little tactful yielding in things not essential often helps to carry a point which is essential.

Except when the patient is extremely ill, the hair should be combed daily. It should be divided into two parts and plaited at the sides of the head, high enough not to get under the ears when the patient is lying on her side. If the hair is thick and long and the patient tires easily, comb one half in the morning and the other half later. The mouth should be washed out and the teeth cleansed at least twice a day. If the patient is strong enough, even if not able to sit up, she should be able to clean her teeth quite comfortably by the use of a small tooth-brush and a little kidney-shaped basin to hold under her chin. If she is not strong enough for this even with some assistance, the mouth must be washed out by the nurse. An orangewood stick wrapped in gauze or absorbent cotton can be used, but the cleaning is more thorough when done with the finger. Wash thoroughly the inside of the teeth and up well on the gums, and clean the tongue well, particularly if there is fever. A pleasant mouth wash is made of one-half glass of water, a teaspoonful of listerin, and a teaspoonful of glycerin. This wash keeps the tongue moist and is pleasant to the taste. If the tongue is much coated, use peroxid of hydrogen; it is cleansing and can be used undiluted.

Baths for therapeutic purposes. Many baths, such as cold and hot packs, cold sponge baths, alcohol baths, cold or tepid "bed tub" baths, cold sprays, and steam baths, are given in bed for therapeutic purposes. Cold packs are given either to quiet the nerves or to reduce fevers. For the pack usually given to quiet and induce sleep, the articles needed are:

2 blankets	Ice bag or gauze for
2 sheets	compresses
A foot tub full of water	Ice
70° to 80° F. in temperature	A hot-water bag for
A rubber sheet	the feet

Put the rubber sheet and one blanket under the patient. Wet the sheets thoroughly in the tub, then wring them dry enough not to drip, and put one sheet under and one over the

patient, tucking them in about the legs and the arms and body. Fold the sides of the first blanket over the sheets and pin them together. Then cover all with the second blanket, tucking it well under the sides of the patient and around the feet. Put the ice bag to her head and the hot-water bag to her feet. If she shivers when first put into the sheets, the reaction will be better. She can be left in the pack for one or two hours and may fall asleep. When a pack is to be given to reduce fever, use only one blanket and keep the sheets wet by sprinkling them occasionally for fifteen minutes with the hand or a whisk broom.

Giving a tub bath in bed. A spray or tub bath can be given in bed with little fatigue to the patient. For this bath it is best to have two large rubber sheets. One is placed on the bed under the bottom sheet; the other over the bottom sheet, but under the patient. Stretch strong cords from the head to the foot of the bed on both sides at a height of a foot or a foot and a half above the mattress. Then bring the edges of the rubber sheet up over the cord on each side, fastening it securely with clothespins. At the head and foot of the bed, bring up the ends of the sheet and fasten them to the bed, or to the cords at the corners of the bed.

After the bath, the water may be dipped out and the rubber sheet dried with towels. Two nurses working together can carefully unfasten the bottom end of the rubber sheet from the cord, roll it into a funnel shape, and let the water run out into a tub or pail placed at the foot of the bed. After the patient has been dried, the rubber sheet should be removed from the bed.

Giving a sponge bath to reduce fever. Cold sponge baths are given to reduce fever. Place your patient between blankets. Then with a soft sponge or wash cloth proceed as in a bath for cleansing purposes; only do not wipe the patient, but leave the parts of the body more uncovered and allow the water to dry by evaporation. The water used may be of the temperature of water as it ordinarily runs from the cold faucet,

or if the patient's temperature is very high, ice may be added to make the water cold. If the patient is very nervous and objects seriously to the cold, do not insist on the use of ice in the water, for the nervousness and irritation of the patient will largely counteract the results which might be obtained from the iced water. The bath should continue for from fifteen minutes to half an hour. The strokes with the wash cloth should not be too heavy. They are generally up, but their direction makes little difference. Keep cold cloths or an ice bag on the head and, if necessary, a hot-water bottle at the feet. Your patient must never be allowed to have cold feet. The temperature of the patient is taken about half an hour after the bath, and will indicate the effect of the bath.

Salt rubs. Salt rubs are very easy to give and are valuable for their stimulating and strengthening effects. They can be given in two ways:

(1) Rub the body briskly with a handful of wet salt; then either spray off with cold water or take a quick cold tub bath.

(2) Dip a towel in a strong solution of salt and let it dry; then rub it briskly over the body.

The first method is the better, when the nurse is helping, as she can rub the back and parts of the body not easily touched by the patient. The second method is best when taking the bath alone. The two methods can be combined, using the salt towel for the back.

QUESTIONS

1. Give in detail the preparations necessary before beginning a bed bath.
2. Describe in detail the giving of the bath.
3. Of what should the daily toilet of an ill patient consist?
4. How is a cold pack given, and for what purpose?
5. How would you give a tub bath in bed?
6. Describe the method of giving a sponge bath for reducing fever.
7. For what are salt rubs given?
8. What two methods may be used in administering them?

CHAPTER THIRTY-TWO

METHODS OF GIVING VARIOUS TREATMENTS

THE most perplexing part of home nursing, to the untrained and inexperienced nurse, is the giving of various treatments. As she lacks the deft and ready touch which training and experience give the professional nurse, the simplest of these appears to her a complicated process. In addition to this, the physician not infrequently takes for granted knowledge which she does not possess, and she goes about the task of giving an enema, applying a compress or poultice, or some other common requirement of nursing, without being at all sure that she is doing it as it ought to be done. Most of these things are really very simple when a few special points are explained; and it is my object in this chapter to give such explanations as the average inexperienced nurse may need.

The enema and its purposes. Enemas are given for three purposes: as purgatives, for nutrition, and for administering medicine. The simple enema for purgative purposes is the most common; but it is often misused, as few people know how to administer it correctly. There seems to be a general idea that the higher the bag is hung, the more effectual the enema will be, and that a large quantity of water should be used. It is never necessary to give more than from one to two quarts of water unless by the orders of the physician. A large enema is not only unnecessary, but, given too frequently, it is injurious, as it distends the walls of the intestine more than is necessary, and if repeated continuously will weaken them and cause them to dilate.

The simple enema. A purgative or simple enema may be of water, soapsuds, or normal salt solution (a teaspoonful of salt to a pint of water). In the soapsuds enema only very pure soap should be used; castile soap is best. This enema causes a certain amount of irritation in the intestine, resulting

in a movement of the bowels. The enema should be at a temperature of 105° F., as it must be either hotter or colder than the body to insure that it will be promptly expelled.

For giving an enema, a fountain syringe is the best. Unless a high enema is ordered, the rectal nozzle which comes with the bag is used; for a high enema a rectal tube which can be bought in any drug store is slipped on over the nozzle. The rectal tube is made of red rubber and can be bought in various sizes suitable to a child or an adult.

Giving the enema. Have ready a bedpan and toilet paper, and have the bed protected by a rubber sheet. Place the patient on the left side, with knees flexed and the right knee drawn higher than the left, as in this position the lower intestine is relaxed and the tube can be more easily inserted. Enemas are occasionally given with the patient lying on the back, with knees flexed, or in the knee chest position, in which the patient kneels, with chest against the bed and head turned sideways. The bag should be hung only from six inches to one foot above the patient, as hanging it higher causes pain in some cases, and also makes it difficult for the patient to retain the water. Oil the tube before inserting it, and let the water run through it until it is warm. If the rectal tube is used, it should be carefully and gently introduced from nine to twelve inches. This should give no pain to the patient.

Sometimes the tube will not go into the rectum, owing to an accumulation of feces in the lower bowel, a twist in the tube, or a failure to pass the tube around a fold in the intestine. In such a case, open the stopcock and allow a little water to flow through into the bowel. If, after this, it is still difficult to insert the tube, draw it well back and introduce it again, slowly and gently, and it will probably pass the obstruction. If the patient finds it difficult to retain the water until the full quantity is given, stop the flow until the contraction of the intestine has ceased; then continue the flow of water.

An enema should be retained from fifteen to twenty minutes,

and then an effort made to expel it. It is not well to allow the patient to retain an enema indefinitely. If the feces are retained after they are softened by the water, poisonous matter may be absorbed into the system. If the first enema is not expelled when it should be, give a small second enema, hanging the bag higher and allowing the water to enter with more force. If the patient is not too ill, getting up and walking around will often start the return flow. If the bowels are not evacuated after the second enema, massage of the abdomen, making pressure particularly over the left side, will frequently start the water.

The nutrient enema. For giving a nutrient enema, a piston syringe is generally used, but the enema can be given with a fountain syringe. Glass syringes are best, as they can be more easily cleaned. Rubber syringes are hard to clean, and as we cannot see into them we can never be sure that they are clean. A rectal tube is used, attached to the point of the syringe or to a funnel. The position of the patient is the same as directed in the other cases, except that in addition it is well to elevate the hips by placing a pillow under them. After the fluid has been inserted, if there is any inclination to expel it, press against the rectum with a towel. After the enema has been given, the patient is turned over on the right side and left with the hips elevated.

A nutrient enema must be as nearly as possible at the temperature of the patient. It should be prepared a little hotter than it is to be given, as there will be a certain amount of cooling in the passage through the tube. Lubricate the tube, fill the funnel or syringe, and then insert the tube. If a funnel is being used, open the stopcock, and watch the funnel to see that it does not become empty. Continue pouring steadily into the funnel until the prescribed quantity has been used. Since a nutrient enema must be given very slowly, the funnel should be raised only high enough above the patient's body to allow the fluid to run. If a syringe is used, the pressure on the piston

must be very slow and steady. In case the patient complains and seems to have difficulty in retaining the fluid, stop and press a towel against the rectum, and continue the treatment when the intestine becomes quiet.

If the distress is great, it is much better to give only a part of the enema and have it retained, than to persist in giving all and then have it rejected. After the liquid has been passed through the tube, wait a minute or two, then slowly remove the tube and apply pressure to the rectum. Turn the patient on the back or the right side, with hips elevated.

When a patient is fed for days by nutrient enemas, purgative enemas must be given at least once a day. Some part of the food nearly always remains unabsorbed, and this must be removed, as it will otherwise form gas in the intestine and make it impossible for the patient to retain the nutrient enema. Washing out the bowels at least once a day with soapsuds, salt water, or clear water, an hour before the time for a nutrient enema, will prevent its rejection and often make it possible for the patient to be nourished for a much longer time in this manner.

If the rejection of an enema occurs, do not conclude that it is impossible for the patient to retain another, but try to get at the reason for the failure. The enema may have been too hot or too cold, or may have been given too rapidly; or there may have been gas or feces in the bowels, or the time may have been too long since the giving of the last purgative enema.

Medicinal enemas. Medicines such as salts, glycerin, and turpentine are sometimes ordered as enemas. As these are intended to be returned immediately, they are given at the same temperature as the purgative enema, 105° F. Narcotics and stimulants and medicines of starch, oil, or other soothing substances are sometimes given by enema, and as these are to be retained, they are given by the same method as a nutrient enema.

Irrigating the bowels. An irrigation differs from an enema in that the water is thrown into the body and allowed to run out

immediately. For giving an irrigation, use a fountain syringe, a rectal tube (Fig. 75), a Y-shaped piece of tubing which may

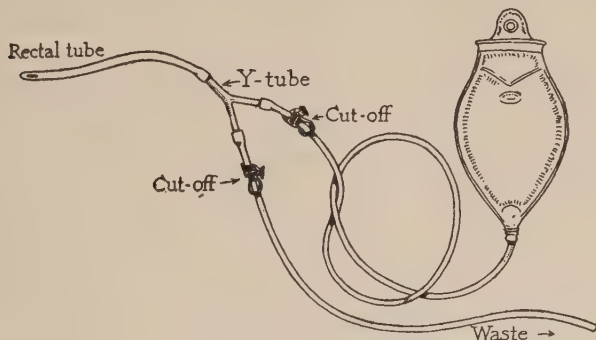


FIG. 75. The apparatus needed for irrigating the bowels.

be either of glass or nickel, and a piece of flexible rubber tubing for the return flow. Connect the rectal tube with the stem of the Y-tube, the syringe with one fork, and the escape pipe with the other fork. There should be a stopcock on both the tube connected with the bag and the escape tube. Hang the bag higher than when giving an enema. Use the same care in running off the cold water, and in oiling and inserting the tube, as when giving an enema.

The clear water, salt water, or whatever prescription has been ordered by the physician, is prepared in a pitcher and carried to the bedside. It must be of a temperature from 110° to 112° F. Use from two to six quarts, according to the orders of the physician or the necessity of the patient, watching to see that the patient does not become too fatigued. After inserting the rectal tube, let about a quart run into the body; then close the stopcock connected with the bag and open the one connected with the waste tube, the end of which must rest in a bowl or slop jar. The water should run back from the body. As soon as this return flow stops, close the waste pipe and open the tube connected with the bag, and let in water

until about a pint has been used, or until the patient is uncomfortable. Proceed in this way, allowing the water to run into and out of the body, until it returns clear. If when the waste pipe is opened the water does not return, the flow may be started by pushing the rectal tube in a little farther or withdrawing it a little bit. Sometimes the flow is checked by a slight bend of the tube or by an obstruction that closes the mouth of it; moving the tube will usually remedy this.

Douches and their use. A douche is a stream of water directed against a part to cleanse it, to reduce congestion and inflammation in it, to check hemorrhage, or to stimulate the nervous system. Douches are of various kinds; for example, spinal, vaginal, nasal, throat, ear, and eye douches. They are given hot, cold, or medicated.

Spinal douches. The spinal douche is given to relieve nervousness and insomnia. It is usually given with a rubber spray attached to the faucet of the bathtub; but if such a spray is not available, a pitcher may be used and the water poured down the spine. Have the patient sit upon the edge of the bathtub, while water is sprayed or poured up and down the spine. At the same time the patient's back should be rubbed briskly. Cold water is generally used for this treatment, but if the patient finds this too severe, warm or hot water may be used.

The vaginal douche. The vaginal douche is given with a fountain syringe having a point designed for that purpose. The temperature is from 110° to 112° F. for cleansing purposes, and from 118° to 120° for checking hemorrhage or allaying inflammation. Use from two to three quarts of water. The patient is placed on her back on a douche pan, and the bag is hung about two feet above the body. The air should be expelled from the tube before inserting it. The medicines generally used are normal salt solution, carbolic acid (1 part to 120 parts of water), boric acid (2 per cent), creolin (14 per cent), green soap (1¼ per cent), or clear hot water. Douches

are generally ordered by the physician, who also directs the medicine which should be used. Be careful that the bag is clean, and free from medicines used for enemas or other purposes. Wash it thoroughly with hot water, or better still, sterilize it by boiling before giving the douche.

Nasal douches. The nasal douche is used perhaps too freely, as the constant employment of a spray or douche frequently causes irritation in the nasal region; but when suffering from a cold, one should clear the nostrils with a douche.

It is better for the amateur not to use a spray, for the spray forces the water back, and frequently carries with it germs from the throat into the Eustachian tube (page 29). A small syringe, like an ear syringe, which throws back a gentle stream, can be used. One way of douching the nose is to prepare the solution in a cup or glass, and to hold the glass under the nose and drink it up through the nose. Be very careful about blowing the nose after allowing the fluid to run into it. Closing one side of the nostril and blowing violently with the other frequently opens the Eustachian tube and forces mucus into the tube. Blow either into a pus pan or a handkerchief, without pressure against the nose.

If one nostril is closed with phlegm and the other open, syringe through the *closed* nostril, so that the fluid can escape through the open nostril. When the nose is sprayed or syringed through the open nostril, the fluid cannot escape, and it lodges back of the nose, where it causes irritation and may be carried into the Eustachian tube. One of the most common causes of deafness is an inflammation of this tube following an attack of influenza or cold, or brought on by the violent blowing of the nose. Try not to swallow while spraying, as in the act of swallowing, the mouth of the Eustachian tube is opened. Bend the head forward, keep the mouth open, and breathe through the mouth. To aid in breathing through the mouth, make the sound of *e-e-e-e-e*. If the water is too cold, and causes coughing, the syringing should be stopped.

Ear douches. Great care must be taken in syringing the ear. Prepare the solution at a temperature of from 100° to 105° F. and inject the water gently into the ear. A fountain syringe with the small nozzle attached is the best to use. The nozzle should be put at the edge of the ear and not forced in too far. Hold the syringe just high enough to allow the water to run, and let the water flow gently into the ear, a small basin being held close under it to catch the overflow. Dry the ear with absorbent cotton.

Eye douches. Never put medicine or drops in the eye unless ordered by the doctor, but washing with boric acid solution is permissible (page 43). Always wash the eye by movements directed away from the other eye. Nothing is more infectious than the discharge from an eye that is inflamed; the infection may be carried from one person to another, or from one eye to the other. Be careful (1) to hold the head so that the eye to be syringed is down, (2) to syringe away from the other eye, and (3) to catch the fluid in a piece of absorbent cotton. Never use the same piece of absorbent cotton for both eyes. After syringing the eye, wash the hands most carefully, and if the eye is infected use a disinfectant for the hands. For some reason, when working over an infected eye one often has an itching sensation in one's own eyes and a desire to put the hands to them. This impulse must be sternly repressed.

Counter-irritants. By a counter-irritant we mean anything, hot or cold, applied to the skin, which helps to draw the blood to the surface. One of the simplest counter-irritants in use is the hot-water bag. In using this, the water must be hot but not boiling. A bag filled with boiling water will sometimes burst and burn the patient badly. It is well not to fill the bag too full. Be sure that it does not leak and that the stopper is perfectly tight. The bag, especially when applied to an unconscious patient, should be completely covered with flannel. Some persons, after an operation or when unconscious, have been burned with hot-water bags. In the majority of such

cases it is the fault of an untrained assistant. Nurses in training are taught that when a hot-water bag is put beside an unconscious patient it must be wrapped carefully and in addition have at least one thickness of blanket between it and the patient. The air should be pressed out of a hot-water bag before using, as this makes it soft and not so likely to burst. In home nursing it is wise to have two or three hot-water bags for use in emergencies. If this is not possible, a hot brick or flatiron, or a bag of sand heated on a radiator or in a very moderate oven and enclosed in flannel, can be used to supplement the hot-water bag and keep the feet warm when the rubber bag is needed for some other part of the body.

In most houses electricity is now available, and electric warming pads are much used as a means of applying heat. At night or in an emergency they are quickly available, and when heat is required for a long time they are a great convenience. An electric pad should not, however, be turned on at full force and left with a child or a helpless patient, as there is danger of burning if the pad becomes overheated. The same precaution should be used at night, particularly if the pad is inside of the bed under many thicknesses of covers, for it is possible for an overheated pad to set fire to the bedclothing. If set for the mild current, it can be safely used.

Poultices. Poultices are not used as much as they formerly were, and are not used at all for abscesses, as it is now believed that they keep the tissues warm and moist and make conditions favorable for the development of the germs. They are occasionally ordered in cases of pneumonia, or for the abdomen. They are usually made of flaxseed. The water must be boiling before the meal is added, and enough meal should be used to make the mixture thick enough to drop clean from the spoon. A teaspoonful of soda added to half a pint of water helps to make the poultice light. After mixing the materials for the poultice thoroughly over the fire, take them off and beat them until they are light. Be sure that the cloth

is large enough to cover the poultice and fold it well over at the edges. The quantity of mixture to be put upon the cloth must depend upon the condition and part of the body to which the poultice is to be applied. For example, for an abdominal poultice it should be spread rather thin, particularly if there is excessive pain or inflammation in the abdominal walls or organs.

Be very careful not to apply a poultice hot enough to burn the patient, as it is easy to blister the skin in this way. Test the heat by laying the poultice against your cheek or a tender part of the arm. After laying the poultice on the body, cover it with oiled silk, folds of flannel, or a towel. When it becomes cool, take it off and cover with flannel the part where it was applied.

Mustard plasters are made, for adults, by mixing together one part of mustard to eight parts of flour and stirring this mixture in water. For children, one part of mustard to sixteen parts of flour is used. Mustard plasters should be left on from five to ten minutes only, according to the amount of irritation needed and according to the sensitiveness of the skin of the patient. Ready-prepared mustard plasters are convenient. As they are very hot, the skin should be slightly oiled to prevent blistering; and after they are taken off, the skin must be washed.

Stupes. Cloths wrung out of hot water are called stupes. The water is frequently mixed with turpentine. Never make the mistake of sprinkling the turpentine on the flannel. It should be mixed with a little olive oil and then with the water. This keeps it from blistering the skin. In making a stupe, use a piece of flannel three times as large as the area of skin to be covered. This must be dipped in water so hot that it is impossible to wring out the flannel with the hands. It can be wrung out by placing it in the middle of a towel, dipping the towel in the water and wringing it out by holding the two ends of the towel; but if the stupes are to be continued for a long time, it is simpler to make a stupe wringer. This is done by taking a piece of unbleached muslin, with wide hems at the

ends, and inserting a stick into each of these hems. The flannel is placed in the middle of the cloth, and the wringer is held by the sticks and twisted.

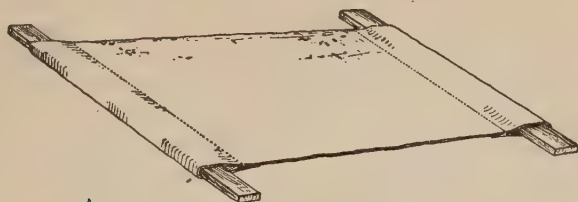


FIG. 76. A stupe wringer.

The doctor may order turpentine stupes to be applied for ten or fifteen minutes. By this he means that you are to change the stupes, removing one as it cools and putting on another, and continuing this for from ten to fifteen minutes. It is customary to vary turpentine stupes with those of plain water, as too much turpentine may blister. At the end of the ten or fifteen minutes the skin must be dried, and warm flannel or warm absorbent cotton laid over it. In putting on stupes the flannel is shaken out, laid in loose folds, and then covered with oiled muslin, a towel, or a piece of flannel.

Hot and cold compresses. Compresses are pieces of gauze, absorbent cotton, or old muslin, which have been wet in either hot or cold water. They are applied to any part of the body where there is acute inflammation. They are applied for fifteen minutes at intervals throughout the day, and must be changed frequently. Sometimes both hot and cold compresses are used, a cold compress being applied first, then hot and cold alternating for fifteen minutes. When applying compresses to an affected eye, use the same care for your patient and yourself that you do in douching the eye, never using the same compress on the two eyes and taking care not to touch your own eyes with your fingers. One general principle that applies to everything used for bandages, compresses, or poultices is that the cloths used must be clean.

QUESTIONS

1. For what purposes are enemata given?
2. What is the difference in the method of giving a simple and a nutritive enema?
3. What medicinal enemas are given by the same method as a purgative enema, and what ones as a nutritive enema?
4. How does an irrigation of the bowels differ from a simple enema?
5. Describe the method of giving an irrigation of the bowels.
6. What is a douche?
7. For what purpose and how is a spinal douche given?
8. What injuries may follow the too frequent and incorrectly given nasal douche?
9. Why should an ear douche be given so carefully and only by a doctor's order?
10. What medicine is it permissible to use in the eyes without an order from a doctor?
11. What particular care is necessary when treating an inflamed eye?
12. What is meant by a counter-irritant?
13. What is a stupe?
14. When are alternating hot and cold compresses used?

CHAPTER THIRTY-THREE

ADMINISTERING MEDICINE

NURSING in one's own family is always a nervous strain, and this strain is increased by the uncertainty that ignorance causes. This is true when the amateur nurse is called upon to administer medicines. After the doctor leaves she can think of so many things that she should like to ask him. How much shall the medicine be diluted? If one medicine is to be given every three hours and one every four hours, what shall she do when the two come together? How close to mealtime may the medicine be given, and shall she awaken the patient when the hour for giving the medicine comes? These questions and others will be answered here, with the belief that such knowledge will help to make the work of the home nurse less trying.

Methods of administration. There are five ways of administering medicines: (1) through the mouth; (2) by inhalation; (3) by inunction or rubbing into the skin; (4) subcutaneously; and (5) through the rectum. These methods are varied according to the type of the case and according to the rapidity with which the medicines are to be absorbed.

Most medicines are given through the mouth unless there is need for immediate action. When given by this method they act rather slowly, although some are absorbed into the blood more quickly than others and thus are quicker in their effects.

Medicines given by inhalation reach the circulation quickly, and this method of administration is sometimes used where quick action is needed, particularly in diseases affecting the respiratory organs.

When medicines cannot be taken through the mouth and immediate action is not necessary, inunction is sometimes used. Infants are often rubbed with olive or cod-liver oil, and the same method is sometimes used with adults.

Medicines given subcutaneously are absorbed at once, and this method is used in cases where immediate stimulation or other prompt results are desired. They are given by hypodermic syringe. In this method it is possible to be absolutely accurate in the dose given, as the entire amount of a medicine given in this way goes into the circulation, which is not the case in any of the other methods.

Medicines given by enemas are absorbed slowly, and much larger doses are necessary than when administration is through the mouth.

Time of giving medicine. All orders for medicines should be written, so that there may be no chance for a mistake in the quantity used; and the proper time for giving the medicine should be definitely stated and adhered to. The time chosen depends upon the effect on the mucous membrane and the effect which it is desired to produce upon the patient.

Medicine to stimulate the appetite is generally given before meals. Alkalis, such as lime, potash, and magnesia, used to stimulate the gastric juice, are given before eating, but when used to neutralize the acidity of the gastric juices they must be given after eating. Acids, such as hydrochloric or muriatic, arsenic, bromids (when given regularly), and all irritating medicines, should be given from half an hour to an hour after meals. Laxatives to act slowly are given at night. Those given to bring quick results are given before breakfast or when the stomach is empty. Hypnotics are given at night, the hour depending on the quickness with which the medicine acts.

Rules for handling and giving medicines. The following rules for the handling and use of medicines will cover most of the cases arising in an ordinary household:

(1) All drugs should be locked up where no one can get at them who does not understand medicines and their uses.

(2) Poisons and strong medicines should be kept separate from others. Poisons should be marked so as to be unmistakable. They may have colored labels or be kept in colored

bottles, and an even better plan is to use bottles of a distinctive shape which can be recognized even in the dark. A death's-head label, if large enough, is desirable. They should never be kept on the same shelf with any other medicine. The top shelf is the best place, for two reasons: it requires an effort to get at them, and they are out of the reach of children.

(3) Never take a medicine in the dark, however sure you may be that you know what is in the bottle. There is always the possibility of a mistake, or someone may have changed the bottle for another.

(4) Never use an unmarked medicine, either liquid or powder. If the label is lost, throw away the contents of the bottle or package. Many powders have practically the same appearance. Epsom salts and oxalic acid are easily mistaken for each other.

(5) Look at the label three times: first, when the bottle is taken from the shelf; second, as the medicine is poured out; third, when the bottle is returned to the shelf. It is possible for the eye to fail one so that the wrong bottle is picked up in a hurry. Pour out the medicine with the label up, so that while you are measuring you unconsciously see the name. Then, as you return the bottle to the shelf, again read the label. With care such as this there is little chance that a mistake will be made.

(6) Measure carefully and exactly. If the doctor has ordered a certain quantity of medicine, that is the dose he intends to be given, not a drop more or less. If the liquid is allowed to run over the edge of the spoon, it may increase the dose from a quarter to a half. If a solution has been prepared for a certain percentage of a grain to a teaspoonful, one may easily give double the amount. A graduated glass, or, if drops are to be given, a pipette, will make the measurement exact. Every household should have a measuring glass in the medicine closet. A teaspoonful is a very uncertain measurement, both because the size of the spoon may vary and because medicines

measure varying quantities to a teaspoonful according to the viscosity of the liquid. A teaspoonful of syrup, for example, is larger than a teaspoonful of water. If minims are ordered, measure with a minim glass, as minims and drops are not always the same. Always shake the bottle, for the sediment in the bottom is often the chief ingredient in the prescription, and if the liquid is poured from the top and later from the bottom without shaking, the strength of the medicine actually taken varies greatly.

(7) Do not buy medicines in large quantities. In many cases they change with time. Some may lose their strength, while those prepared with alcohol become more concentrated because of evaporation. Always recork the bottle securely to prevent evaporation.

(8) Give medicines at the hour ordered. The physician knows exactly how much of the medicine he wants the patient to get, and how soon it will be necessary to repeat the dose. If he orders it given every three hours, he means three hours and not three hours and twenty minutes. If a doctor orders, for example, a stimulant every three hours, he knows that at the end of the time stated the patient will need that medicine. If allowed to go without it beyond the time prescribed, the patient is weakened, and the medicine has extra work to do in overcoming the effect of the delay.

(9) If two medicines are to be given, be sure that they can be given at the same time. Some drugs are not compatible, and we should have clear directions from the doctor as to the possible necessity of an interval between the two. If, when they are mixed, a deposit is formed or the color changed, it is a sure sign that the two are incompatible.

(10) Acids and irons should not be allowed to touch the teeth. They should be taken through a glass tube or paper straw put well back in the mouth, and the mouth thoroughly rinsed afterward. If this is done, there should be no injury to the teeth.

(11) When medicines are given to an unconscious patient, all powders and pills should be dissolved and dropped slowly and gradually, well back into the mouth.

(12) The dilution of medicines should receive careful attention. Cough syrups are taken undiluted. All irritating medicines, such as acids, arsenics, and iron, should be well diluted. Saline cathartics are given as saturated solutions.

(13) Make medicines as palatable as possible. A medicine intended to be given hot should be hot, and one meant to be cold should be cold. When possible, the taste of medicine should be disguised, especially with children. Castor oil is practically tasteless if a piece of ice is held in the mouth before it is taken and the oil and spoon used in giving it are cold. Another method of administering it so that the taste is not detected is by putting it in a glass of soda water flavored with sarsaparilla, lemon, or orange. In preparing castor oil with soda water, be careful not to daub oil on the edge of the glass. Have the contents of the glass cold, and put in an abundance of the flavoring. Medicines can often be given in capsules instead of in powders. It is not wise to give medicine to children in milk or food, as it may make them dislike the food so that they will refuse it later.

(14) Medicine should not be given with food which lessens the effect or has a bad influence. Calomel, for example, should not be given with milk or eggs, or with salt food. Iodids should not be given with starchy food. If the doctor does not give directions on this point, make sure by asking him.

(15) When a medicine is to be continued for a long time, understand the adverse symptoms which may be expected from its use. It is not necessary to tell these to the patient, who might through nervousness imagine or exaggerate the sensations produced. Many medicines are cumulative in their effects; that is, as they are given day after day, the effect upon the system becomes greater and greater until poisoning may result. Examples of this are found in medicines con-

taining strychnin and arsenic. Ask the doctor to explain exactly the symptoms which will indicate the time for stopping the medicine or, on the other hand, the necessity of reporting to him.

(16) It is a good plan to fasten on the door of the medicine closet, with thumb tacks, a list of the medicines to be found in it, and whatever simple directions may be needed by anyone needing medicines in a hurry. The medicine closet should be kept in scrupulous order, with the bottles all in their own places and set so that the labels, so far as possible, can be easily seen. The closet should be placed where a light can easily be thrown into it. Another wise plan in some households would be to keep in the closet, or fastened to the door, a list of simple remedies which are not medicines.

(17) When a patient is extremely ill, medicines, particularly stimulants, should be given as regularly through the night as through the day. As the patient becomes convalescent, the night doses may be omitted; but it is best for the amateur nurse to have the permission of the physician before omitting a stimulant. A patient is of course not awakened for a sleeping medicine.

Taking patent medicines. There are few greater evils in the world than that of taking patent medicines. There are laws in the United States which control the sale of these medicines and require the manufacturers of those containing poisonous or injurious drugs to print upon the labels the contents of the bottle; but there are so many ways of evading the law or of making the labels confusing that many persons take these medicines, knowing little of the contents and nothing of their effect. The safest plan is not to take patent medicines at all.

One serious consequence which may follow the taking of patent medicines is the forming of a drug habit. Much has been written on the danger of forming habits by the taking of morphin or other forms of opium, cocain, or other well-known drugs; but few realize that habits can be formed by taking

other medicines besides these. One of the worst cases of medicine habits I have ever known was one of trional, a medicine which is given freely by physicians and taken freely by the laity. Other drugs, such as phenacetin, aspirin, strychnin, veronal, calomel, and coca-cola (which contains caffein), are taken too freely by many who know nothing of their effects or of the danger of forming a habit by their use.

Taking medicine for insomnia. Most of the drug habits are formed in trying to break up insomnia. There are so many simple ways of helping to bring on sleep that all other means should be tried before resorting to medicines, and these should never be taken except under the advice of a physician. Frequently the physician can relieve even long-standing cases of insomnia by simple means. Sometimes the trouble is in the digestion ; sometimes it is caused by nervous strain, overwork, or lack of exercise or fresh air.

Many persons exaggerate the amount of sleep they lose. If they would stop and calculate the number of hours they sleep, though they think they have been awake half the night, they would often find that they had slept almost as much as the ordinary person. They may perhaps have a wakeful time in the middle of the night, but they sleep when first in bed and in the morning, and really get as much sleep as they need. The dread of insomnia is more a matter of nervousness than anything else. A person in bed rests even if he does not sleep, and we exaggerate the real effects of sleeplessness.

Taking another's prescriptions. Never take another person's prescription, for, although you may be sure that you know the effects of the medicines included in it, there may be something in your physical condition (for instance, in the condition of your heart or kidneys) of which you do not know, which may cause a medicine that has been prescribed for someone else to be injurious to you. Never buy medicines from a drug store and take them without knowing the contents. Most headache medicines and medicines for colds contain

derivatives of coal tar. All of these are very depressing to the heart, and many cases of heart failure have followed the taking of headache medicines. Medicines for colds contain also camphor and other drugs, which, taken freely, may cause convulsions or other complications.

QUESTIONS

1. There are five ordinary ways of administering medicines. What are they, and what is the advantage of each?
2. How is it determined whether a medicine is to be taken before a meal or after?
3. Seventeen rules have been given for taking and giving medicines. Mention as many of these as you can, explaining the reason for each rule.
4. Why is it not considered advisable to take medicine for insomnia?
5. What objections can be made to the habit of taking patent medicines?
6. Explain why persons should not take medicines that have been prescribed by a doctor for another person.

CHAPTER THIRTY-FOUR

FOOD FOR THE INVALID

THE ability to prepare food for an invalid is one great test of the fitness of a nurse for her profession. It may demand in some cases not only a knowledge of food values and skill in cookery, but an intuition as to what will please the taste of the patient. Particularly in tuberculosis and other wasting diseases, the appetite has to be tempted and the food varied, and recovery may in great measure depend on the nourishment that the patient receives.

Punctuality. One all-important point in serving an invalid is to have the meals on time. Promptly at the hour when the tray is due, it should appear. Nothing is more trying to a sick person than to have to wait for a meal. It is a good idea to plan your menus at least twenty-four hours ahead, so that you will be sure to have your materials in the house; then there will be no delay from waiting for them to be delivered.

The serving tray. There are two convenient types of invalid trays which can be bought. One is the tray made to sit on the bed; the other stands on the floor with the supporting part under the bed and the tray over the patient. The latter form is adjustable and is the more convenient, but is a little more expensive than the bed tray. If the patient must eat in her room for a long time, the comfort which a good tray will give over-balances the original cost of the tray.

Preparing the tray. The preparation of the tray is almost as important as the preparation of the food itself; for, frequently, the first appearance of the tray, as it is brought into the room, helps to determine whether the patient will or will not eat with appetite. The linen should be of the daintiest. The china should be the prettiest in the house — thin, dainty, and varied. Many times a patient can be tempted to take food merely because, where yesterday she took it from a blue cup,

today she is taking it from a pink one, or because something has been done to show that the nurse has given thought to the preparation of her tray.

In arranging the tray, place yourself before it and make sure that china and silver and everything on it are as carefully placed as they would be on a table. Let the glass and cup be on the proper side, the knives and forks placed as they should be, and everything arranged so that there need be no changes made at the side of the patient. See that everything needed is on the tray. An invalid may lose all appetite and refuse to eat through having to wait while the nurse goes to find the necessary salt, pepper, spoon, or something else which, through carelessness, has been omitted.

Always go cheerfully to prepare the tray. There is nothing that makes an invalid feel more depressed than to see the nurse or the member of the family who is going to prepare her food sigh and wonder what she can get for her next. She feels that she does not want to eat anyway, and if it is so much trouble she would rather do without. If you wish her to enjoy her food, show her that you take pleasure in the preparation of it.

Details of service. Take care that the food that is to be hot is hot, and the food that is to be cold is cold. If the kitchen is far from the bedroom, a little ingenuity may be necessary in keeping food hot. Carry the broth or soup in a cup sitting in a bowl of hot water. Warm the plate for the meat or vegetables and cover them with a hot plate, or use a dish that has a water receptacle under it for keeping it hot or cold. It is well to have a little stove (gas, alcohol, or electric) on the same floor as the sick room, so that food may be reheated if necessary; for to an invalid half-warm food is unpalatable. Frequently the placing of a flower upon the tray, or doing anything that shows that it has been a pleasure and interest to you to prepare it, will help to tempt the appetite.

To eat alone is to many invalids a peculiarly dismal experience, and if the food can be made to show the personal touch,

and to give the idea that someone has thought out the details and taken pains to please, there is a kind of companionship in the very thought of it.

Planning menus. Never ask a patient what she would like to eat. As soon as she is asked that, she does not want anything. If she expresses a desire for one particular thing, unless it is forbidden, get it if possible. Give as great a variety of food and combinations of foods as your diet list will allow. If you know of certain foods which the patient fancies, do not give them too frequently, but hold them in reserve for the days when she is depressed and below par. Never give anything that is not permitted by the doctor, but stick absolutely to his diet. Sometimes one indulgence in something that does not agree with the patient may undo the work of the doctor for days or even weeks.

When a doctor prepares a diet list, he is careful to include all the elements (minerals and vitamins) necessary for the well-being of the patient; and if the selection of the food is left to the nurse, she must be careful not to overlook this point. For in many cases of dieting, particularly in continued dieting, a food-deficiency disease such as pellagra, or a mild scurvy, has developed. This has been due to an incomplete diet in which one or more necessary elements have been omitted from the food.

A restricted diet should never be prolonged indefinitely unless it is under the supervision of a physician; patients, unsupervised, frequently continue a diet too long, forgetting that though it was necessary at one time to omit some food, later this food should be taken, and that the physician would have added to or discontinued the original diet after a period of time.

As it is the food that is eaten, not merely served, that affects the patient, the tray should be examined after each meal to make sure that the patient is really obtaining the necessary elements.

Providing the right quantity. When the quantity is to be limited, as is sometimes the case in the excessive hunger of typhoid fever, never put more upon the tray than the patient may eat. There is nothing more exasperating, when you are so hungry that you want to eat everything you see, than to have part of it carried away. Let the patient feel that she may eat everything that is on the tray. Occasionally, if the patient does not have a communicable disease, the nurse may bring up enough for two and take a meal with the invalid ; or she may suggest that a member of the family shall eat with her. Where there is real interest and real desire to tempt the appetite, there are many little ways in which the nurse may help. It should be a positive pleasure to a nurse to be able so to prepare and serve food that her patient cannot resist it, no matter how averse to eating she felt before the tray was brought.

Pleasing the eye. When children are fed on a liquid diet, a change in the color or character of the glass often helps to relieve the monotony and tempt the appetite. A bit of ribbon tied around the glass, a quaint spoon, or some other little novelty will give a child a momentary interest and pleasure which goes a long way toward aiding digestion. Milk may be served with cream whipped upon it or the white of an egg beaten into it to make it froth up so that it can be eaten with a spoon. Individual ice-cream freezers are to be had, and if the doctor allows it, milk may be given seasoned and frozen. Fruit juices, such as orange juice, also may be frozen into sherbets. A dot of jelly on top of whipped cream adds to its attractiveness, and sometimes fruit juices can be frozen into a harlequin ice of two or three colors.

Liquid diet. The physician usually directs liquid diets, giving a list of things he desires to have used. Common articles of liquid diet are broths, beef extract, tea, milk, gruel, eggnog, cream, soups, cocoa, and buttermilk. Albumen water also is used, particularly in nausea. Sometimes the use of a

siphon will make milk more acceptable to the patient. Eggs can be beaten up into many liquid foods.

Semi-liquid diet. In the semi-liquid menu are included such foods as jellies, blancmange made with gelatin or with Irish moss, meat jellies, custards, eggs, milk and cream, toast, asparagus, vegetables put through a colander, and strained oatmeal. Very definite directions should be secured from the doctor about this diet.

Soft diet. The soft diet is like the semi-liquid, but with the addition of chicken, scallops, brains, oysters, and creamed dishes.

Solid diet. A solid diet may include anything that the patient can digest. One can devise a variety of methods of cooking the same article of food. Nurses are taught to cook eggs by leaving them in hot water for seven minutes, the pan having been removed from the stove. This cooks them smoothly like a cream without hardening the white, and makes them easy to digest. Small omelets cooked in individual pans, and with a very small amount of butter, are digestible and appetizing. Shirred eggs, prepared by breaking the egg into a buttered cup and setting it in the oven, are good. Eggs in the form of a bird's nest are attractive. To make these, beat the white of the egg, and when it is like a meringue put it in a buttered plate, rounding it up and pressing it down in the middle to make a hollow, into which the unbroken yolk is dropped. The plate is then set in the oven and left until the white is a delicate brown and the yolk slightly cooked.

Toast may be varied by making pulled bread. This is done by taking a loaf of fresh bread, pulling out the crumb, and putting it in a very slow oven until it is crisp. Another attractive way to prepare bread is to cut the loaf into thin slices, not cutting through the crust at the back, but leaving enough of it whole to form a band to hold the slices together; put a little butter between the slices and set the whole in the oven until brown and crisp. Vary the shape of the toast by cutting it into strips and triangles.

Irish-moss blancmange. Irish moss may be bought at the drug store. It should be washed and soaked in cold water, one sixth of a cup of moss to a cup and a half of water, for twenty minutes or half an hour. Then it is cooked from fifteen to twenty minutes in one and three-fourths cups of milk in a double boiler, first wrapping the moss in gauze. It should be flavored with vanilla and set aside to cool. It will be very thin when first taken from the fire, but when chilled it becomes firm.

Broths. The simplest and best way of making broth from any kind of meat is to add a pint of water to a pound of meat, and let it simmer on the back of the stove for about four hours. At the end of this time it can be strained and will form a jelly. This can be reheated and given as a liquid, or eaten cold as a jelly. When beef juice is ordered, it is better to buy a meat press for it. The meat is cut into strips and seared on a broiler, and the juice then squeezed out in the press. This beef must not be overheated or the juice will coagulate.

In preparing food for the invalid, the main points to remember are: Have all appointments spotless and well arranged; be punctual; have hot things hot and cold things cold; season daintily; vary the menus; and take care not to allow any untidiness in serving the meal in the sick room.

QUESTIONS

1. Why should an invalid's meals be served punctually?
2. Give in detail the method of preparing an invalid's tray.
3. What points need particular attention when serving food to an invalid?
4. Give general rules for planning menus.
5. What is the danger in prolonging a restricted diet?
6. How can a limited diet be made attractive to a child?
7. What is the difference between a semi-liquid and a soft diet?
8. When a solid diet of rather limited variety is ordered, how can it be varied to add to its attractiveness?
9. Give some main points to be considered in feeding an invalid.

CHAPTER THIRTY-FIVE

HEADACHE AND HYSTERIA

EITHER chronic recurring headache or the nervous, overwrought condition that culminates in attacks of hysteria are disabling. Each of these ailments is a real affliction. Each leads to semi-invalidism and is a barrier to sustained, useful work. They are peculiarly afflictions of women and are two conditions that the home nurse should understand. She should know what immediate treatment is best for the patient and also what can be done to bring back a condition of permanent health.

Causes of headache. Perhaps the most common causes of headache are eyestrain, constipation, frontal sinusitis, and nervous fatigue. In diseased conditions such as liver, kidney, heart disorders, anemia, arteriosclerosis, and some endocrine-gland disorders, there is often accompanying headache; but in such cases the headache is merely one of a number of symptoms and it can be relieved only by a treatment of the disease that causes it.

Eyestrain is probably the greatest single cause of headache, and many headaches that are attributed to other causes are from this cause alone. The pain in headache from eyestrain may be located in any part of the head. It may be over one of the eyes or over both eyes or in the temple. With far-sighted or near-sighted eyes, the pain is most commonly in the back of the head. Headaches frequently start at the age when a child is beginning to study at school, though even younger children are subject to them. Abnormalities of the eyes are frequently inherited, and it is not unusual to find several different members of a family with defective vision and subject to the headaches that are caused by eyestrain.

This type of headache is apt to become periodic and to develop gradually into chronic migraine headaches, which are

accompanied by nausea and vomiting. It is a well-known fact that a strained condition of the eyes will upset the stomach, and it is not wise to begin to cut out foods from the diet with a belief that they are causing "bilious headaches." Rather should the eyes be carefully examined by an oculist.

Chronic constipation causes headaches, either because of the toxin which is being absorbed into the blood from the material retained in the intestines or because of the irritation to the nerve endings because of the fecal mass. (See Chapter 7.)

The headache which frequently accompanies a cold is most often caused by inflammation of the frontal sinuses. For this reason, when a headache is present during a cold, the nose and throat should be treated to prevent chronic infection in the frontal sinuses.

Girls with eye defects are apt to have headaches before and during menstruation, though some believe that this headache is due to pressure from the pituitary gland, which is somewhat enlarged just before and during menstruation.

Treatment for headache. Treatment for headache should consist first of all in finding out the cause and having it removed, when possible. Rest, quiet, and sleep are essential in the relief of severe headache. Cold applications to the head are helpful; and if the feet are cold, heat should be applied to them. Of the many medicines sold for the relief of the pain (most of them coal-tar derivatives), almost all are depressors of the heart. These medicines should not be taken unless one has first consulted his physician. One of the greatest causes of the habit of drug taking is the chronically recurring headache. One should consider well before getting into the habit of taking medicines habitually on account of headaches, particularly if it is necessary to increase the amount of the dose to get relief.

In cases of recurring headache, the physician should find the cause and relieve the condition if possible. If he finds it necessary to prescribe a medicine for constant use, his prescription and no other medicine should be used.

Hysteria and its treatment. In attacks of hysteria the patient loses control of herself. She may start weeping or laughing and be unable to stop. To be subject to attacks of hysteria is very distressing, and while there are women who work themselves into this condition to attract attention, physicians now recognize that a tendency to hysteria may be a real disease and a most distressing one. There is often a physical cause for such attacks. One should be patient and kind in dealing with a nervous person, but at the same time firm and unyielding, and it is sometimes best to ignore the attack entirely. Fresh, cold air on the face, a dose of aromatic spirits of ammonia, or a drink of cold water may aid the patient to regain self-control. Holding the patient's hand, or pressing her arm quietly and firmly, may also be a help. Never argue with such a patient, but be quiet and controlled and thus make her feel your strength and desire to help her.

Hysterical patients are sometimes cured by providing them with some real interest which enlists their attention, either temporarily or permanently. They should be led to think of something besides themselves and not to dwell upon their own sensations. Hysterical patients have been known to simulate successfully nearly every known disease, sometimes with such accuracy as to deceive physicians.

On the other hand, the nervous system may be really affected in some obscure way which presents the appearance of hysteria, and if a person is subject to repeated attacks of this nature careful physical examinations should be made by a physician to determine if possible the cause and the treatment needed to correct the physical conditions which may be the cause of nervous attacks. At the time of the attack, quiet firmness on the part of the nurse will help the patient to obtain control of her nerves, and wholesome surroundings and occupations will help to restore the patient to normality.

QUESTIONS

1. Give four common causes of headache.
2. Name some other diseased conditions of which headache may be a symptom.
3. What is the greatest single cause of headache?
4. What can be done for the relief of a headache?
5. What can you say of headache remedies?
6. What is hysteria?
7. How should a patient with an attack of hysteria be treated?
8. What in general can be done to get a hysterical person back to a normal condition?

CHAPTER THIRTY-SIX

TREATMENT OF UNCONSCIOUS STATES

IN this and in a number of succeeding chapters we shall discuss emergency situations. These carry in them the element of the unexpected, and the meeting of them is the greatest test of a nurse, trained or untrained.

When the emergency comes, the very first thing the nurse must remember is to keep cool and to be quiet and apparently deliberate in her movements. She must think quickly and act without hesitation, but by her calm manner she must exert a quieting influence on others who may be excitedly rushing about.

Unconsciousness. Unconsciousness is one emergency that frequently has to be met, and it is best to be somewhat sure of the nature of the attack before giving a treatment.

Sudden unconsciousness may mean fainting, apoplexy, poison, intoxication, convulsion, hysteria, or an epileptic attack. Intoxication may be detected by the breath, and one should be sure not to mistake a case of apoplexy for one of intoxication, for the result of such a mistake may be serious. If there are no symptoms of poisoning, follow this general rule: If the patient is pale and the pulse weak, lay him down flat or with head lower than the rest of the body; if the face is red and the pulse full, place a pillow under the head and apply ice or cloths wet in cold water to the head, and do not give a stimulant.

Fainting. Fainting is caused by a diminished amount of blood in the brain. It may be due to fright, a shock, or anything strongly affecting the nervous system, or it may be caused by weakness from hunger or overexertion. Some persons faint easily, at the sight of blood, from nausea, or from the close air of a crowded room, and in some this tendency is constitutional. In such cases no very great alarm need be felt, as the conse-

quences of the fainting fit are not serious. Hysteria sometimes produces a successful imitation of fainting, although it is a great mistake to assume that one can always control a faint feeling by the will. In a true faint there are unconsciousness, paleness, relaxed muscles, and a weak and rapid pulse. In hysteria there is not unconsciousness, the face may be flushed, the pulse is not weak, and if you try to lift the eyelids they will resist.

An approaching fainting fit may sometimes be warded off by leaning over and putting the head down, or lying down, so that the blood may return to the brain. The patient should lie flat, with the head as low as the body, or lower. The clothing, especially at the throat, should be loosened, and persons should not be allowed to crowd around. Cold air or cold water on the face and rubbing the hands, arms, and legs help to restore circulation. Smelling salts and ammonia may be put to the nose, but this must be done carefully so that the nose and throat will not be irritated. The patient should remain perfectly quiet and receive a stimulant as soon as possible.

Convulsions in children. Convulsions may accompany indigestion, teething, constipation, and other slight ailments because the nervous system is affected. They sometimes come at the beginning of an infection. Children are more subject to them than are adults.

The first symptoms of a convulsion are likely to be twitching of the muscles of the hands and face and rolling of the eyes. In a convulsion of this nature the child then becomes unconscious and its body stiffens. The pulse is weak, the respiration rapid, and the skin wet and clammy.

The quickest remedy is a hot bath, or, better still, a hot mustard bath. Be careful in preparing the bath not to have the water too hot. It should be 110° F. If you do not have a thermometer, hold the elbow in the water long enough to make sure the temperature is not too high. The proportion of mustard to use in a mustard bath is one tablespoonful to about

a gallon of water. If the mustard is first mixed with a small quantity of cold water, it will dissolve more easily, and this in the end saves time. The hot water should begin to act with quieting effect in a few minutes, but the bath may be continued for from ten to twenty minutes, adding hot water gradually to keep the temperature even. If there has been constipation, it is well to wash out the bowels to relieve the pressure there. If this is done at once when the restlessness and twitching of the muscles are observed, an attack is sometimes warded off. The child often goes to sleep just after the attack, and there should be perfect quiet, as a sudden noise may cause a return of the convulsion.

Convulsions in an adult. Aside from hysteria, the two causes that predispose to convulsions in an adult are epilepsy and uremic poisoning.

In an epileptic fit the patient falls down suddenly, giving a sharp cry; his body twitches violently, and he sometimes foams at the mouth. The fit lasts only a few minutes, and nothing need be done except to loosen the clothing, move away anything which may cause him to hurt himself, and put something between the teeth to prevent his biting the tongue. The best thing for this purpose is a wad or roll of muslin, such as a large handkerchief. In putting it in the mouth be careful not to get your fingers between the teeth. After the attack the patient becomes conscious, and will often sleep for some time.

Uremic convulsions indicate diseased kidneys, and are caused by the retention in the system of the waste products which are eliminated by the kidneys when in a healthy condition. The convulsion is severe, and is followed by unconsciousness. The patient should be put to bed, covered well, and kept warm with hot-water bags around her; and as this is a dangerous condition, a doctor should be called at once. There are often premonitory symptoms before an attack of this kind. When nursing a case of Bright's disease, watch for these symptoms and if possible ward off the attack. The indications

of its approach are headache, vomiting, and drowsiness, and they can sometimes be relieved by giving hot packs or steam baths. It is best to have clear directions from the doctor so that you will know exactly what to do in such an emergency.

Sunstroke. Extreme heat either in the sun or in the house may cause sunstroke. Heat accompanied by moisture is most likely to cause it. Rider Haggard records the case of a woman who had lived without injury for years in India, but who had a sunstroke on a farm in Norfolk, England. In certain tropical climates, such as that of Puerto Rico, where there is little moisture in the air during the hot season, sunstroke is unknown.

The symptoms of sunstroke are unconsciousness, dry and hot skin, flushed face, a slow, full pulse, and labored breathing.

Remove the patient to a cool place, apply cold wet cloths or ice to the head and face, and if possible immerse the patient in a cold bath or use a cold pack. When the patient is conscious, give cold water to drink, but do not use stimulants.

Heat exhaustion. Heat exhaustion is caused by the same conditions as sunstroke, but the symptoms and treatment are quite different. There is great weakness but no unconsciousness, the face is pale and wet with perspiration, the pulse weak and rapid, and the breathing shallow.

Remove the patient to a cool place and loosen the clothing, but do not apply cold externally. Give cool water in moderation, and such stimulants as tea, coffee, or one-half to one teaspoonful of aromatic spirits of ammonia in one-fourth to one-half glass of water.

In some cases where men work under conditions of extreme heat, they suffer exhaustion from the loss of salt from the body in perspiration. In some of the deep, hot mines of England salt is added to the drinking water of the worker.

Concussion of the brain. A fall or a heavy blow on the head is sometimes followed by concussion of the brain. The patient lies motionless, apparently in a heavy sleep, and if aroused falls back into the same condition. Treatment consists of laying

the patient on the back with the head slightly raised, and applying a hot-water bag to the feet if they are cold. Hot drinks may be given, but not alcohol in any form; and there should be absolute quiet. This unconsciousness may last for hours without bad results, *but a physician should be called*, as there is always the possibility that there may be a fracture of the skull or more injury to the brain than appears at first. Sometimes in such cases a blood clot forms on the brain and only quick work by a surgeon can prevent serious consequences.

If a person who has received a blow on the head falls into a heavy sleep, he should be watched carefully. If he cannot be aroused, a physician should be called at once.

QUESTIONS

1. By what symptoms would you determine whether the head of an unconscious patient should be raised or be kept low?
2. What is the cause of fainting? By what simple method can it be prevented?
3. Describe the first-aid treatment for a person who is fainting.
4. What conditions may cause a child to have convulsions?
5. Describe the bath commonly given for convulsions, giving the temperature of the water and method of procedure.
6. What are the usual causes of convulsions in adults?
7. Compare the symptoms of sunstroke and of heat exhaustion, and give the differences in the treatments of the two conditions.
8. What is the cause of, and what is the treatment for, concussion of the brain?

CHAPTER THIRTY-SEVEN

OTHER COMMON EMERGENCIES

It is important to understand what should be done in emergencies, for two reasons. The first is that the situation often demands immediate action and there may be no doctor at hand. The second is that it is important to know when a doctor should be sent for. There may be needless alarm about some trifling matter. At another time there may be failure to understand the gravity of the situation and the patient may be subjected to needless discomfort or actual danger because a physician is not called.

Shock. An injury, severe or slight, may be followed by the condition known as *shock*. I have seen children in this condition after a slight fall when they were practically uninjured. It is often spoken of as "collapse," and the symptoms are somewhat like those of collapse in disease.

In a condition of shock, the face is drawn and pinched, the skin cold, the pulse very weak, sometimes not to be felt at all at the wrist, and the patient is often unconscious. With children there may be vomiting.

The treatment is to stimulate with heat, and unless there is unconsciousness, to give stimulants such as aromatic spirits of ammonia, one-half to one teaspoonful in one-fourth to one-half glass of water. If there is unconsciousness, an enema of coffee may be given. Rub the arms and legs to improve the circulation, but keep the patient as quiet as possible and do not uncover him. In an emergency hospital, beds with warm, thick blankets to be placed next to the patient are kept ready for accident cases, and as soon as it is known that a patient is coming, hot-water bags are put into the bed so that it will be warm.

Retention of urine. When the urine is secreted by the kidneys but not passed from the bladder, the condition is called

retention of urine. This may occur after an operation, or when the patient suffers from shock. In young girls and boys it is a form of nervousness or hysteria, sometimes caused by retaining the urine for a long time without the opportunity of passing it. Sometimes it is caused by difficulty in using a bedpan. Heat applied over the bladder by means of hot cloths or hot-water bags will sometimes start the flow. Hot water in the pan or vessel to be used, or running water from the faucet or from one pitcher to another, may help. Pouring warm water over the pubic region, or a hot hip bath, may give relief. If these remedies fail, it may be necessary to draw the urine with a catheter, but this should never be done except by a doctor or a nurse. If it is not properly done, there is danger of causing irritation of the entrance into the bladder or of carrying infection into the bladder itself.

Colic or cramps. Colic is caused by an accumulation of gas in the intestine, usually from undigested food but sometimes from a sudden chill or an obstinate attack of constipation. As the symptoms of colic and those of both food poisoning and appendicitis are very much the same, one must be sure of the diagnosis before giving treatment; and, if the attack is a severe one, it is advisable to communicate with a doctor and let him direct the treatment. Symptoms of intestinal colic are local pain, frequently a distended abdomen, a history of constipation, and no fever.

A mild attack may be relieved by drinking hot water with or without a little soda, by soda-mint tablets, or by an application of heat over the abdomen. It is well to apply heat to the feet and keep the patient well covered, as there is often a slight shock in these cases.

Vomiting. When vomiting is due to indigestion, it is best not to check it until the stomach is empty. Drinking a glass of lukewarm water will help to clear out the stomach. If the paroxysm is very severe and there are signs of exhaustion, or if the vomiting occurs after an operation, it is best to check it.

This may be done by applying a mustard plaster or mustard leaves over the stomach, bathing the throat and face in cold water, feeding small pieces of ice, laying cloths wrung out of ice water around the throat, or giving vinegar to smell. Sometimes persistent vomiting can be stopped by turning the patient face downward with a doubled-up pillow under the abdomen, the head low and the body on an incline.

Hiccoughs. A hiccough is a spasmodic contraction of the diaphragm — the muscular partition lying between the chest cavity and the abdomen. It is caused by indigestion, or by overeating or overdrinking. Taking a deep breath and holding it sometimes gives relief. A sudden fright or startling noise, drinking a glass of water while holding the breath, or lying on the face in the position used to check vomiting, also may give relief. It is best to stop hiccoughs immediately on their appearance if possible, as the longer the attack continues the more obstinate it is likely to be.

Croup. An attack of croup is alarming but seldom dangerous. It begins with a loud cough; the face becomes blue, and the child struggles for breath. Hot cloths around the throat often give relief. It is well to give an emetic, and if the child is subject to these attacks a bottle of syrup of ipecac should be kept in the house. The dose is one teaspoonful. Croup kettles are found efficacious in many cases. Allowing the child to breathe in steam from an inhaler or a pitcher of hot water helps to loosen the phlegm, but care must be taken to prevent a burn.

Nosebleed. As a rule this is unimportant, but in occasional cases so much blood is lost that it is well to check the bleeding. Do not allow the patient to lean over the basin, as this will increase the flow of blood. Put cold applications over the nose and on the forehead and back of the neck, and little pieces of ice well up inside the nostrils. A compress pushed inside of the nose will stop the bleeding, or two compresses may be used to make pressure on the outside of the nose. Strap them tightly

with adhesive plaster against the sides of the nose. Sometimes heat put to the feet or a hot foot bath will draw the blood from the head and control the hemorrhage.

Bleeding after tonsil operation. Apply ice externally to the throat, and let the patient hold a lump of ice in the mouth. A solution of vinegar held in the mouth will sometimes stop the bleeding. Apply pressure to the carotid artery — the artery which lies in front of and just below the ear. *Send for the doctor immediately.*

Bleeding after the extraction of a tooth. Pack a piece of gauze into the cavity and press down with the teeth against it. If the bleeding is very profuse, it may indicate that the patient is a bleeder, and it is best to have the case treated by a dentist or a doctor.

Foreign bodies in the eye. It is best not to close the eye when a foreign body gets into it, for if the foreign particle is a sharp piece of coal or a particle of stone or plaster, closing the lid down may force it into the eyeball. Syringe it out with a medicine dropper, or try to dislodge the object by washing the eye with an eye glass or by pouring a stream of water over the open eye. Turn the lid up or pull it down, and remove the particle with a clean handkerchief or cloth. Do not rub the eye which has the foreign body in it, but rub the other eye.

Foreign bodies in the ear. Sometimes a child will put some small object into the ear. If it is anything that may swell with water, like a bean, do not syringe it. If a moth has entered the ear, holding a light close to the ear will cause it to crawl out. If the object is hard to dislodge, go to a specialist; for an unskilled person may easily damage the tympanic membrane.

Foreign bodies in the nose. Do not try to dislodge an object from the nose by poking an instrument up into the nostrils, as this only pushes it farther up. Tickle the nose or use a pinch of pepper to cause sneezing. Sometimes the object can be dislodged by pressing with thumb and finger on the outside of the nose, beginning close up to the eyes and pressing and stroking

gently toward the end of the nose. If this does not dislodge the object, take the child to a physician. When small children are about, one should never mention the possibility of their putting beans into their noses or ears, as there seems to be a fascination in the idea and they are very likely to try it.

Foreign bodies in the throat. Objects like bits of meat, coins, buttons, or even soft articles like a piece of bread, may lodge in the throat and stop the entrance of air into the trachea. If the patient is a child, take him by the feet, hold him upside down and shake him, or beat him upon the back. A grown person should be thumped on the back, and if this does not bring relief he should be laid face down on a couch with the head hanging down, and beaten on the back to dislodge the intruding object.

Swallowed pins or coins. If a child swallows a pin, coin, or other object, do not give a cathartic. The cathartic, by increasing the muscular activity of the intestines and liquefying their contents, forces the object along and gives it no chance to be covered by the feces. Soft bulky foods like potatoes, cabbage, or bread may be given. If the child complains of pain, take him to a doctor. Even a sharp-pointed pin will as a rule go through the digestive tract without doing harm. It is recommended by some physicians that the patient be made to swallow small rolled-up balls of cotton.

Treatment for freezing. Freezing is a very gradual process, and an ear, finger, or other member may freeze without the person to whom it belongs being aware of it. If after feeling intense pain from cold the part becomes numb and pain is no longer felt, there is reason to suspect freezing.

Prompt treatment should be given by rubbing the part briskly with snow or putting it into cold water. Do not come near the fire or into a warm room for some time, certainly not until sensation is fully restored. To prevent damage, the frozen tissues must be thawed out very gradually. The part

should then be dressed as though it were burned, with milk of magnesia or other solution.

Stings of insects. The poison of a bee is acid, and for a bee sting apply ammonia or soda, rubbing it well into the wound. Give aromatic spirits of ammonia in the proportion of half a teaspoonful to one third of a glass of water. Salt, wet earth or cold water may be applied to the wound to give relief.

The poison of the wasp is alkaline, and the sting of a wasp should be treated with vinegar, lemon juice, or other weak acid.

QUESTIONS

1. Describe the condition known as "shock." What is the treatment for it?
2. What is the cause of retention of urine, and what is the treatment for the condition?
3. What is the treatment for colic?
4. What can be done for vomiting?
5. What can be done for the relief of hiccoughs? of croup?
6. Give the treatment for nosebleed; for bleeding after a tonsil operation; for bleeding after extraction of a tooth.
7. How would you deal with foreign bodies in the eye? in the ear? in the nose? in the throat?
8. What is the appropriate treatment when a pin or some other sharp object is swallowed?
9. What is the treatment for freezing?
10. What is the treatment for the sting of a bee? of a wasp?

CHAPTER THIRTY-EIGHT

APPARENT DROWNING, GAS POISONING, AND ELECTRIC SHOCK

No situation in which a nurse finds herself calls for quicker action than cases of apparent drowning, gas poisoning, and electric shock. In these cases the essential treatment is to give artificial respiration, and it is far more important that this be started at once than most persons realize. When the emergency arises is not the time to learn how to administer the treatment; so the amateur nurse should practice the giving of artificial respiration until she is thoroughly familiar with how it is done.

In any case that requires artificial respiration, *get the ventilation of the lungs started at the earliest possible moment* and leave the arrangement of less important matters until later. The two generally recognized ways of administering artificial respiration are the Schaeffer method and the Sylvester method.

The Schaeffer method. This method was devised by Professor Schaeffer of Scotland. It is used in the English army and is recommended by the American Medical Association because of its simplicity and effectiveness. The following directions issued by the American National Red Cross explain how it is administered:¹

When the patient is removed from the water, gas, smoke, or electric contact, *get to work at once with your own hands*. If possible, send for a physician.

1. Lay the patient on his belly, one arm extended directly overhead, the other arm bent at elbow and with the face

¹ These directions are taken from the official poster, "Saving Life," issued by the American National Red Cross, and approved by twelve nationally known organizations concerned in administering artificial respiration. This method has been found exceedingly successful. The material here quoted is used by special permission, through the courtesy of the American National Red Cross.

turned outward and resting on hand or forearm, so that the nose and mouth are free for breathing.

2. Kneel straddling the patient's thighs with your knees placed at such a distance from the hip bones as will allow you to assume the position shown in Figure 77.



FIG. 77. The Schaeffer method of administering artificial respiration.

Place the palms of the hands on the small of the back with fingers resting on the ribs, the little finger just touching the lowest rib with the thumb and fingers in a natural position, and the tips of the fingers just out of sight.

3. With arms held straight, swing forward slowly, so that the weight of your body is gradually brought to bear upon the patient. The shoulder should be directly over the heel of the hand at the end of the forward swing. Do not bend your elbows. This operation should take about two seconds.

4. Now immediately swing backward, so as to remove the pressure completely.

5. After two seconds, swing forward again. Thus repeat deliberately twelve to fifteen times a minute the double movement of compression and release, a complete respiration in four or five seconds.

6. Continue artificial respiration without interruption until natural breathing is restored — if necessary, four hours or longer, or until a physician declares the patient is dead.

7. As soon as this artificial respiration has been started and while it is being continued, an assistant should loosen any tight clothing about the patient's neck, chest, or waist. *Keep the patient warm.* Do not give any liquids whatever by mouth until the patient is fully conscious.

8. To avoid strain on the heart when the patient revives, he should be kept lying down and not allowed to stand or sit up. If the doctor has not arrived by the time the patient has revived, he should be given some stimulant, such as one teaspoonful of aromatic spirits of ammonia in a small glass of water or a hot drink of coffee or tea, etc. The patient should be kept warm.

9. Resuscitation should be carried on at the nearest possible point to where the patient received his injuries. He should not be moved from this point until he is breathing normally of his own volition and then moved only in a lying position. Should it be necessary, due to extreme weather conditions, etc., to move the patient before he is breathing normally, resuscitation should be carried on during the time that he is being moved.

10. A brief return of natural respiration is not a certain indication for stopping the resuscitation. Not infrequently the patient, after a temporary recovery of respiration, stops breathing again. The patient must be watched and if natural breathing stops, artificial respiration should be resumed at once.

11. In carrying out resuscitation it may be necessary to change the operator. This change must be made without losing the rhythm of respiration. By this procedure no confusion results at the time of change of operator, and a regular rhythm is kept up.

In this way the air is pushed out of and drawn into the lungs of the patient. The treatment should be continued until the patient breathes well — if necessary, for four or five hours.

If a second person is present, she may wipe out the mouth, remove false teeth or anything else that is in the mouth, draw the tongue forward, and loosen the clothing. Rubbing upward on the arms or legs to force the blood onward in the veins and applying heat to the feet are beneficial, *but the respiration is more important and the one attending to this should not leave her work to look after the more minor details.*

When consciousness returns so that the patient can swallow, give hot drinks such as hot coffee, tea, lemonade, or even hot water.

The Sylvester method. The Sylvester method, in which the patient is laid on his back, is older than the Schaeffer method. It is not often used now except when breathing stops during an operation and the patient cannot be turned on his face. In the

beginning the clothing is loosened, the mouth opened, and the tongue is pulled out and tied to keep it from falling back and closing the throat. If a second person is present, she can attend to the tongue and thus make it possible for the respiration to be started without delay.

To administer artificial respiration by the Sylvester method, lay the patient on his back with a roll of clothing or something of the kind put

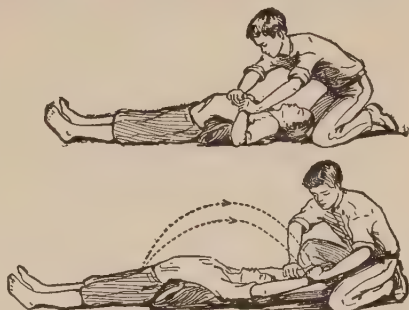


FIG. 78. The Sylvester method of administering artificial respiration. This method is now only rarely used.

under his neck, so that his head will fall backward. Kneeling at the patient's head, grasp the forearms just below the elbows and fold his arms down across the lower ribs. Then raise the arms up over his head, and bring them down again to his sides, making pressure again over the ribs. Continue slowly raising and lowering the arms, pressing upon and opening out the lungs with a bellows-like movement, until natural breathing begins again. After the patient is breathing, wrap him in a warm blanket, rub his arms and legs to restore circulation, apply heat if necessary, and give him stimulants.

Giving artificial respiration to infants. An occasional newborn infant fails to begin breathing promptly and it is necessary to give artificial respiration. The method which I have found most practicable is the following :

Take the infant, back down, in the two hands, as shown in Figure 79. The left hand supports the shoulders and head, with the little finger under the infant's left arm, the thumb under the right arm, and the other fingers under the head. The right hand supports the buttocks and legs. Bring the two hands toward each other, doubling the infant in the middle of

its body; then separate the hands until the infant's body is slightly curved backward. As in other methods, the mouth

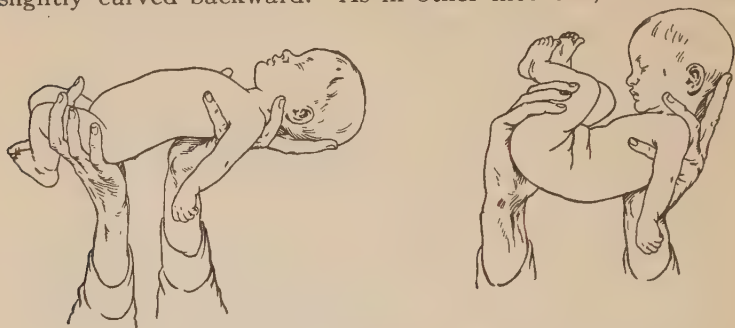


FIG. 79. Administering artificial respiration to an infant.

must first be cleansed of all foreign matter and the tongue held well out of the mouth, and the movements should not be given too rapidly.

Treatment of apparent drowning. In apparent drowning the object of the treatment is to get the water out of the lungs and oxygen down into the air sacs again. Haste is necessary.

Turn the patient face down. Then, standing astride of her, administer artificial respiration by the Schaeffer method (page 354). This will force the water out of the lungs. If the necessary help is available, rub the limbs (toward the body) and apply heat. When consciousness begins to return, give stimulants (page 348).

Gas poisoning. Occasionally in coal mines, wells, or silos, there are cases of carbon dioxid poisoning. Such accidents are rare and the treatment is artificial respiration. Usually in gas poisoning, carbon monoxid is the offending substance. It is a constituent of both natural gas and of manufactured city gas, and many persons are poisoned by inhaling the gas supplied for cooking and lighting. Numerous other cases follow the breathing of fumes from automobile exhausts, gas water heaters, and gas stoves.

In carbon monoxid poisoning the trouble is that the gas has

united with the hemoglobin of the red corpuscles and tied it up so that it cannot carry oxygen. The treatment is for the purpose of keeping the lungs as well ventilated as is possible and of helping to keep the blood circulating until the heart and the lungs are functioning efficiently and the hemoglobin is again free to do its work.

Classification of cases of carbon monoxid poisoning. Cases of carbon monoxid poisoning may be divided into three classes according to their severity. In those of the first class, the patient has not lost consciousness. In those of the second class, the patient is still breathing but has nearly or quite lost consciousness. In cases of the third class, breathing is imperceptible and the patient is apparently dead. The later treatment varies according to the severity of the poisoning, but always the first thing is to get the patient into fresh air, begin artificial respiration, and send for a doctor.

Treatment of cases of the first and second classes. In cases of the first class, the patient has not lost consciousness, but he has headache, dizziness, and nausea which is sometimes followed by vomiting, drowsiness, relaxed muscles, hurried breathing, and rapid heart action. The treatment is artificial respiration, when necessary, accompanied by brisk rubbing of the bare skin. The patient should be revived by having ammonia held to his nostrils, care being taken at the same time not to choke him with the fumes.

In the second class of cases the patient is still breathing but has nearly or quite lost consciousness. If the patient seems to be able to do his own breathing, place him upon his back on a flat surface, with a rolled coat or blanket under the shoulders and neck, so that the head is well back. Then loosen the clothes and rub the legs and arms hard upward. If he is completely unconscious and respiration is feeble, turn him face down and give artificial respiration by the Schaeffer method. When consciousness returns, hold ammonia to the nostrils and apply heat to the body.

Treatment of cases of the third class. In a case of the third class, breathing is imperceptible and the person is apparently dead. Lay such a patient upon his stomach with his head turned sideways and give artificial respiration by the Schaeffer method (see page 354) until breathing begins. Even if there are no indications of life, this treatment should be persisted in for at least an hour.

In a case of this kind, word should be sent as quickly as possible to a physician or a hospital. Where the necessary equipment is at hand, patients are made to breathe a mixture of carbon dioxid and oxygen. The carbon dioxid stimulates respiration, and the oxygen provides a richer immediate supply of oxygen for the tissues.

In most places a pulmotor can be found at either a hospital or a fire house, and breathing can be restored with greater speed with this machine.

Prevention of carbon monoxid poisoning. Recently there have been many instances of carbon monoxid poisoning in garages. The gas is formed by the incomplete combustion of gasoline in the cylinders of the engine and it gives no warning of its presence, as it is tasteless, colorless, and odorless. To avoid danger from it, a gasoline engine should not be run in a closed room unless an exhaust leading to the outside is provided for the waste gases.

Many cases of carbon monoxid poisoning result from gas escaping from an ordinary cooking stove. Frequently liquids boil over on the stove or food is spilled, partly filling the holes of the gas burners, and few seem to realize that unconsumed carbon monoxid may escape through these partly filled holes at the time the gas is burning. A gas stove should be kept absolutely clean; the burners should be taken off and washed in soap and water at least once a week, and always when food has been spilled on the burners. If every gas point does not burn with a clear blue flame, or if some do not burn at all, a sharp-pointed instrument should be used to open up the holes.

Gas-burning water heaters are another common source of carbon monoxid in dwellings. The flame burning in the interior of the tank away from the air does not receive enough oxygen to burn the carbon of the gas to carbon dioxid; so carbon monoxid is formed. Many families have been overcome by carbon monoxid generated in this way. Before a gas water heater is installed, a householder should make sure that it is a safe kind.

Treatment of electric shock. In electric shock the breathing stops. The treatment for it is artificial respiration and as soon as possible the administration of a heart stimulant. Unless a pulmotor or hospital facilities are available, the respiration is best carried on by the Schaeffer method. It should be started promptly and kept up until breathing starts or medical help arrives. The employees of electric companies are now trained to deal with injuries from electricity, and sometimes they may be in a position to give aid. The treatment for lightning shock is the same as for injury with an electric current. The essential points in each case are to get respiration started and to stimulate the heart.

Rescuing from a live wire. In trying to rescue anyone who is in contact with a live wire, it is necessary to use certain measures for self-protection.

(1) Do not touch the wire with the hand. It may be touched with a dry stick.

(2) Do not touch the person before insulating your hand. If the ground on which you are standing and the person's clothing are dry, it is safe to catch hold of him by his clothes; but in so doing grasp only his clothing. Do not touch the hand or any other part of the person himself.

Wrapping the hand in a rubber coat will insulate it. Covering it with dry paper or a dry coat is a protection.

A wire lying on the ground may be chopped in two with an ax that has a wooden handle, or pulled aside by a wooden-handled tool.

QUESTIONS

1. What is the essential treatment for apparent drowning? for gas poisoning? for electric shock?
2. Describe the Schaeffer method of giving artificial respiration.
3. Describe the Sylvester method. When is it used?
4. Describe the method of giving artificial respiration to infants.
5. Describe the treatment for a person rescued from drowning.
6. What is the constituent of gases that ordinarily causes gas poisoning?
7. Distinguish between the three classes of carbon monoxid poisoning, and give the treatment for each.
8. What attention should a gas stove receive to prevent the formation of carbon monoxid?
9. What is the treatment for electric shock?
10. What precautions should be taken in rescuing from a live wire?

CHAPTER THIRTY-NINE

WHAT TO DO IN CASES OF POISONING

IN no cases of emergency work is there a greater need of knowing what to do than in poisoning. It is impossible for anyone to remember exactly the antidotes for all poisons ; but with a general knowledge of the first steps to be taken, much can be done to relieve the patient before the coming of the physician. Where a physician is hard to reach, a " First Aid to the Injured " book, containing suggestions for antidotes, should be kept at hand and the nurse should be able to begin her work without delay.

When to suspect poisoning and what to do. In cases of sudden illness or unconsciousness, we should suspect poison. As a rule, a suicide tells what he has done as soon as the medicine begins to affect him. If the patient is a child or the medicine has been taken by accident, the bottle or the box may usually be found and so we can learn what poison has been taken.

A doctor should be summoned immediately and told *why he is needed*, and if you have been able to discover the nature of the poison he should be told this also. The poisons most frequently taken are opium preparations, carbolic acid, bichlorid of mercury, and arsenic.

Do not wait for the doctor's arrival, but begin treatment at once. (1) Rid the system of the poison. (2) Neutralize the effects with an antidote. (3) Stimulate the patient. (4) Soothe the digestive organs.

Emetics. The stomach should be cleared of the poison either by an emetic or by some mechanical means for causing vomiting, such as sticking the finger down the throat and tickling the back of the throat. Emetics easy to obtain are mustard water (one teaspoonful of mustard to a cupful of water), soda in water (two tablespoonfuls of baking soda to a quart of water), salt and water, or merely a large quantity of warm

water. These emetics are more effective if given warm than if they are either cold or hot. Ipecac is a simple emetic which it is well to keep in the house; the dose is one to two drams. Apomorphin, a drug which is an emetic, is given hypodermically. It is always carried in the physician's and the nurse's medicine cases.

When not to use emetics. In the case of poisons like strong acids or alkalis, or other poisons which injure the mucous membranes, emetics should not be used. Instead give milk, raw eggs, boiled starch, flour and water, barley water, or mashed potatoes, which are soothing to the mouth and stomach and help to prevent the absorption of the poison. Oil is not always to be used, as it quickens the absorption of some poisons.

Antidotes. An antidote is something that counteracts the effect of a poison. For instance, the antidote for an alkali is an acid, such as lemon juice or vinegar. To counteract acids, give limewater, baking soda, plaster, or tooth powder. After the antidote give an emetic, unless the nature of the poison makes the use of an emetic unadvisable.

Bichlorid of mercury poisoning. This preparation of mercury is used a great deal in disinfecting. For this reason it is easy to obtain. The death following bichlorid of mercury is exceedingly painful, as it is frequently slow in its effect, stopping the secretion of urine in the kidneys and causing great agony. The symptoms of mercury poisoning are white and swollen mucous membrane, pain in the abdomen, nausea with vomiting, and bloody movements from the bowels. The skin is cold and clammy and the patient much prostrated and frequently in convulsions. The treatment is first to give white of egg or flour and water and soothing liquids, such as milk. Emetics should then be given. Treat *poisoning by calomel and blue mass* like bichlorid poisoning.

Opium poisoning. Among the common opium preparations are:

Laudanum or tincture of opium, dose four to ten drops.

Dover's powder, dose eight to ten grains.

Paregoric, dose one to four drams (teaspoonful).

Heroin, dose one half to one tenth of a grain.

Morphin, dose one sixteenth to one fourth of a grain.

Morphin is an active principle of opium. The passing of the Harrison law makes it much harder to obtain morphin and is materially decreasing the number of cases of morphin poisoning. Heroin is a compound made from morphin and is a dangerous habit-forming drug. Opium is found, too, in many patent medicines the sale of which has been stopped by the Harrison law.

The symptoms of opium poisoning are drowsiness, unconsciousness, pulse fast and then weak, breathing very slow and shallow, face flushed (almost purple). The pupils of the eyes are contracted and do not dilate when exposed to the light.

The treatment consists of an emetic, followed by a stimulant, preferably coffee, which not only helps the heart action but aids in keeping the patient awake. Do not allow the patient to go to sleep; if necessary, walk him up and down persistently, slap him, use any means to keep him awake, but be careful not to exhaust his strength. If the breathing becomes too shallow, give artificial respiration (page 355) as long as the acute symptoms are present. Vomiting should be continued to keep the stomach empty, as opium is absorbed from the stomach and returned to it even when taken by hypodermic. The patient should be kept warm, as the temperature is likely to be low.

Carbolic acid poisoning. The common use of carbolic acid or phenol in disinfecting makes it easy to obtain. Thus it is one of the most common poisons used by suicides. It is easy to detect, as the odor is noticeable and the mucous membranes of the mouth and throat are burned. The treatment begins with the rinsing of the mouth with alcohol and giving alcohol internally, using either brandy or whisky, one tablespoonful of pure alcohol (not wood alcohol), or wines. The antidote is

Epsom salts, one to two or three tablespoonfuls. Limewater and milk in equal parts, flaxseed tea, or raw eggs may be given ; neither oil nor glycerin should be given, as they quicken absorption of the acid. Urine should be passed if possible ; the patient should be kept warm and stimulants used if necessary.

Creolin, lysol, and Dobell's solution are compounds made from carbolic acid, and the symptoms and treatment are the same as in carbolic acid poisoning. Creosote is another of these compounds, but it is seldom taken in poisonous doses.

Arsenic poisoning. The preparations of arsenic are :

Fowler's solution, dose three to five drops.

Donovan's solution, dose three to five drops.

Arsenic is also found in salvarsan, Paris green, and rat and vermin poisons.

The symptoms of arsenic poisoning are pain in the stomach and abdomen, vomiting, intense thirst, bloody movements from the bowels, rapid, weak pulse, clammy skin, and sometimes unconsciousness.

The treatment begins with an emetic if there has been no vomiting. Then give milk, white of egg, or flaxseed tea. If the bowels have not moved, give castor oil. Watch the urine, as its secretion is sometimes lessened or stopped.

Strychnin. The preparations of strychnin, which is the active principle of *nux vomica*, are :

Tincture of *nux vomica*, dose ten to twenty drops.

Strychnin sulfate, dose one sixtieth to one twentieth of a grain.

Syrup of iron, quinin, and strychnin, dose one to two drams.

The symptoms of strychnin poisoning are restless excitement followed by convulsions, in which the legs become rigid, the arms bent, the hands clenched, the eyes open and staring, and the mouth fixed in a characteristic grin. After the convulsion the body relaxes, but the slightest touch or noise will cause another attack.

The treatment consists of an emetic, strong tea for the tannic acid contained in it, and charcoal. The patient should be kept

perfectly quiet. The bladder must be kept empty, as the drug will be reabsorbed from the urine if this is not done.

Phosphorus. The preparations of phosphorus are :

Syrup of hypophosphates, dose one to two teaspoonfuls.

Hypophosphate of iron, potassium, sodium, and calcium ; dose ten grains.

Phosphorus is found also in matches, rat poison, and vermin powders and pastes.

The symptoms of phosphorus poisoning are severe pain in the stomach, and vomiting of material which is luminous in the dark. There may be fever, bleeding from the nose, or convulsions.

Give an emetic and clean out the bowels with Epsom salts, one-half ounce in a tumbler of water, or magnesia ; soothe the digestive organs with liquids such as milk or flour paste. Use no oils, fats, or stimulants.

Aconite. Tincture of aconite contains this drug ; dose, three drops.

The symptoms are irregular pulse ; slow, shallow, and weak respiration ; anxious expression with eyes glaring, dilated, and protuberant ; sometimes convulsions.

Give an emetic, also strong tea ; apply heat ; give artificial respiration if necessary and keep the patient quiet, with the head low.

Alcohol. The symptoms of alcohol poisoning are excitement followed by coma, irregular and stertorous respiration, flushed face, pulse rapid and hard, and breath smelling of alcohol.

Apply heat to the feet and cold to the head, and guard against heart failure ; for stimulants give hot coffee or aromatic spirits of ammonia, one teaspoonful in a half glass of water.

Atropin. This is contained in atropin sulfate ; dose one sixtieth of a grain.

The symptoms are dryness of the throat, difficult breathing, dilated pupils, flushed face, restlessness, delirium, and sometimes convulsions.

Give an emetic of warm water ; stimulate if necessary and

give artificial respiration. The bladder should be emptied frequently, as the medicine reabsorbs. Apply external heat, perhaps give a mustard bath, and put hot and cold applications to the head.

Belladonna. Ointments and liniments often contain belladonna, as do atropin and hyoscyamin.

The symptoms are dryness of the mouth and skin, a rash like that of scarlet fever, dilated pupils and staring eyes, headache, restlessness, and delirium.

Give an emetic and a hot mustard bath; apply cold to the head; give artificial respiration if necessary; and watch for suppression of the urine.

Camphor. Found in spirits of camphor, cough mixtures, and liniments.

The symptoms are excitement, giddiness and headache, pain in the stomach, delirium and convulsions, small weak pulse followed by collapse.

Give an emetic, apply heat, and give stimulants.

Chloral. Somnol and chloral hydrate contain this drug. The dose is five to twenty grains or fifteen to thirty drops.

The symptoms are slow and shallow respiration; pulse first slow, then rapid, weak, and thready; there may be unconsciousness, with the muscles relaxed.

Give an emetic; use alcohol and hot coffee as stimulants; give a mustard foot bath; apply heat and treat with electricity. Be careful not to exhaust the patient.

Chloroform. The symptoms are irregular pulse and respiration; the latter may at times stop; the pupils are dilated.

Give artificial respiration, putting the feet higher than the head; stimulate, apply heat, and watch to see whether urine is suppressed.

Cocain. The symptoms are nervousness, irritability, wakefulness, nausea, vomiting, and convulsions. The skin is pale; the pulse rapid at first, but later slow and weak. Respiration is first quick and then slow and labored.

The treatment is to empty the stomach, apply heat, and give stimulants.

Digitalis. Infusion, dose one to two teaspoons; tincture, dose five to twenty drops; fluid extract, two to four drops.

The symptoms are: pulse slow, irregular, and weak; headache; paleness; eyes prominent; respiration rapid; great prostration; possibly convulsions.

Give tepid water as an emetic. The antidote is strong tea, for the tannin contained in it. Give strychnin as a stimulant, and keep the patient quiet and lying down.

Hyoscyamus. This drug is found in: fluid extract, dose one to three drops; tincture, dose ten to twenty drops; and hyoscin hydrobromid, dose one hundredth to one fiftieth of a grain.

The symptoms are thirst, dilated pupils, and unconsciousness or delirium.

Give an emetic and hot baths; apply cold to the head; and if necessary give artificial respiration. Watch the urine.

Iodin. The preparations of iodine are potassium iodid, dose five to thirty drops, and tincture of iodine for external use.

The symptoms are pain and burning in the stomach and abdomen, vomiting and purging, and dark stains in the mouth and on the lips.

First give a paste of water mixed with flour or starch, then give an emetic, and apply heat. Stimulate if necessary.

Lead. Lead is found in sugar of lead, dose one half to two grains.

The symptoms of poisoning are dry throat, a metallic taste, thirst, colic, cramp in the legs, sometimes convulsions, and a dark line on the gums.

The treatment is white of egg and one, two, or three tablespoonfuls of Epsom salts or magnesia, an emetic, soothing drinks, stimulants, and application of heat.

Mushroom poisoning. The symptoms may appear immediately or not until hours after the mushrooms have been

eaten. Nausea, vomiting, colic, diarrhea, weak pulse, labored breathing, and profuse perspiration are the earlier symptoms. Later there may be muscular weakness, collapse, and sometimes paralysis.

The treatment consists of emetics, large doses of castor oil, heat applied all over the body, and stimulants. Call a physician.

Oxalic acid. This is found in the form of oxalic acid crystals which may easily be mistaken for Epsom salts. It is used for removing stains.

The symptoms are burning of the mucous membrane, abdominal pain, cold livid skin, irregular pulse, stupor, collapse, and sometimes convulsions.

Give oil, milk, white of egg. The antidote is chalk or lime. Give stimulants and apply external heat.

Potash. The common preparations of potash are: chlorate of potash, dose ten to thirty grains; cyanid of potassium, one tenth to one twelfth of a grain; cream of tartar (potassium bitartrate), dose ten to sixty grains; saltpeter, dose two to ten grains; caustic potash, used only externally.

The symptoms of potash poisoning are acute inflammation in the alimentary canal, pain, nausea, vomiting, loose dysenteric stools, a weak rapid pulse, shrunken face, cold skin, and unconsciousness. Death may occur with great suddenness.

The general antidotes are dilute vinegar, lemon juice, or cider. Give also oil, barley water, flaxseed tea, milk, white of egg, or gruel, to allay the irritation of the mucous membrane and keep up the strength.

Chlorate of potash is particularly dangerous to children and should not be used by them as a gargle. The acute symptoms of poisoning by this preparation are: vomiting, diarrhea, breathlessness, cyanosis (blue discoloration of the skin), urine dark and diminished in quantity or perhaps suppressed. Sub-acute symptoms are headache, loss of appetite, and pains in the abdomen and other parts of the body.

Cases of poisoning by cream of tartar are rare, but have been known, when a tablespoonful or more has been taken. The symptoms are stomach and intestinal troubles.

Saltpeter poisoning causes burning pain in the throat and stomach, bloody movements from the bowels, fainting, collapse, and sometimes convulsions.

Cyanid of potassium poisoning is indicated by giddiness, faintness, difficult breathing, a weak small pulse, insensibility, and loss of muscular power. The eyes are protruding and shining, and there is an odor of acid on the breath.

There is but little time for treatment. The antidote is a weak solution of sulfate of iron. Cold water should be applied to the head and spine. Give artificial respiration, and go on with it as long as there is any sign of breathing. Give inhalations of ammonia and stimulate with alcohol.

Caustic potash poisoning is indicated by corrosive burns upon the lips or mouth, bleeding and sloughing of the mucous membrane, and vomiting of shreds of membrane and blood.

Prussic acid (hydrocyanic acid). The symptoms of poisoning and the treatment are the same as for poisoning by cyanid of potassium, and like the latter, prussic acid acts very quickly. A strong odor of peaches may be detected where this acid has been spilled.

Wood alcohol (methyl alcohol, wood naphtha). The symptoms are headache, nausea, violent vomiting, collapse, and possibly convulsions. The pupils are dilated, and there are profuse perspiration and great excitement.

Give an emetic, apply heat, and stimulate.

Some dangerous poisons are used in photographic work, and care should be taken to keep them out of the way of children. Poisonous fly paper or fly poison should not be used where children can get at them. Paint is often poisonous, and some people are upset merely by the smell of it if much painting is going on. Some cleaning preparations are poisonous. There are persons who have the dangerously careless habit of using

old bottles without removing the original labels. This should never be done. A rule in every household should be that *nothing whatever in the way of a drug, medicine, powder, or extract should ever be left unlabeled*. It is better to take a little extra trouble than to risk death by poison.

QUESTIONS

1. What is the first step to be taken if it is known or suspected that a person has taken poison?
2. What treatment can be given before the doctor comes?
3. Name some easily obtained household emetics.
4. When should emetics not be given?
5. What is an antidote? What antidotes are given for poisoning with alkalis? for poisoning with an acid?
6. What is the antidote for bichlorid of mercury?
7. Mention some well-known medicines which are derivatives of opium.
8. What are the signs of carbolic acid poisoning? What is the treatment?
9. What are the symptoms of arsenic poisoning?
10. Give the antidotes for the following poisons: aconite, digitalis, iodine, potash.
11. Mention seven kinds of poisoning cases in which the nurse must watch to see that the urine is voided, and give the reason in each case.
12. What poison has the odor of peaches?
13. How does wood alcohol affect the body?
14. What precaution must be exercised if old medicine bottles are to be used?

CHAPTER FORTY

APPENDICITIS AND FOOD POISONING

ACUTE attacks of appendicitis, and cases of one type of food poisoning (botulism), require emergency action. The patient must receive medical attention *at once*. It is vitally important also that an attack of appendicitis should not be mistaken for indigestion or colic and a cathartic given, for many hundreds of lives are lost every year in this way.

Because of the importance of understanding the necessity for prompt calling of a physician and of knowing what to do until a physician arrives, a brief discussion of these conditions is included here.

APPENDICITIS

The appendix walls are composed chiefly of loose lymphoid tissue, very similar to the tissue of the tonsils. Like the tonsils, the appendix often becomes diseased. Streptococci grow in its walls and cause inflammation that is comparable to tonsillitis. As in tonsillitis, the attack may be either acute or chronic.

Acute appendicitis. Attacks of acute appendicitis frequently come very suddenly and are sometimes mistaken for colic. There are severe, sharp abdominal pains which often extend down into the right thigh. The appendix is usually low in the right side of the abdomen, but the pains do not always begin in that region. Sometimes they appear at first near the umbilicus, or navel.

Other symptoms are nausea, vomiting, excessive thirst, troubled countenance, rapid pulse, and fever. There is rigidity in the muscles under pressure over the region of the appendix.

In case of such an attack, send for a physician at once. In the meantime, make the patient as comfortable as possible. Keep him warm, particularly his feet. Nothing else should be done before the doctor arrives. Above all things *do not give a*

cathartic or enema. Either may cause violent contractions in the intestinal muscles, and, if the appendix is badly affected, the contractions may cause it to be ruptured.

If it is thought best to remove the patient to a hospital, this should be done without delay. An hour may mean the life or death of the patient; for the real danger is that the appendix may rupture and release into the abdominal cavity germs that will cause peritonitis. It is because of this danger that early operation is at times so urgently advised. One need not fear that an operation will be performed unless it is absolutely necessary. A diagnosis of appendicitis can now be confirmed by examining the blood, and the feeling among surgeons is that, if the patient's condition permits delay, the best time for an operation is between attacks.

Chronic appendicitis. In some persons the appendix becomes chronically infected, and such persons have more or less acute attacks alternating with periods of comparative quiescence. In such cases there is not the same urgency for an operation as in acute appendicitis; yet it is better to have the appendix removed. This should be done when the person is in good health. The operation is a slight one if there is no inflammation outside of the appendix itself, and in many cases the health and vigor of the person are much improved by it.

One danger in postponing an operation in chronic appendicitis is that an acute attack of such severity may come on that an immediate operation will be demanded. Then, instead of choosing the best time for the operation, it becomes necessary to perform it at the worst time, the time of a severe attack.

FOOD POISONING

Cases of food poisoning may often be diagnosed by the fact that a group of persons who have eaten of the same food all become ill with the same symptoms at the same time. The illness may be caused by either one of two different kinds of bacteria, and the cases are of two distinct types.

Cases of the one kind are usually caused by eating food that is contaminated with germs that are related to the typhoid and paratyphoid bacilli. These germs grow in the body after the food is eaten, and the illness is the result, not of a poisoning in the strict sense of the word, but of an acute bacterial infection.

Cases of the other type are the result of real poisoning. They are due to a toxin formed by a certain bacterium (*Bacillus botulinus*) in the food before the food is eaten. This type of food poisoning is called *botulism*. It is very important that the two types be distinguished in order that cases of botulism may receive antitoxin treatment at the earliest possible moment.

Symptoms in cases of food poisoning caused by living germs. In food-poisoning cases of this type, the onset of the attack is usually from six to twelve hours after eating the contaminated food ; or it may come as late as seventy hours afterward. The first symptoms are frequently chill and headache, followed by severe griping abdominal pains. There is nausea, vomiting, and severe diarrhea, with frequent offensive bowel movements. Later the movements become watery and of a greenish color. There is apt to be severe and prolonged prostration, sometimes amounting to collapse ; also nervousness and restlessness and in some cases extreme drowsiness. The temperature of the body rises sometimes as high as 102° to 103° . The patient usually recovers in two or three days, though severe attacks may last much longer than this.

The doctor should be sent for immediately, and in the meantime the patient must be kept warm and made as comfortable as possible.

Botulism. The bacillus that causes botulism is a relative of the tetanus germ. Its natural home is in rich soil, and it does not attack the human body. It forms spores, and outbreaks of botulism usually come from eating canned vegetables that have not been subjected to enough heat to destroy the spores.

In from twelve to thirty-six hours after eating the poisoned food, most cases of botulism develop acute nausea, vomiting, and diarrhea. In about

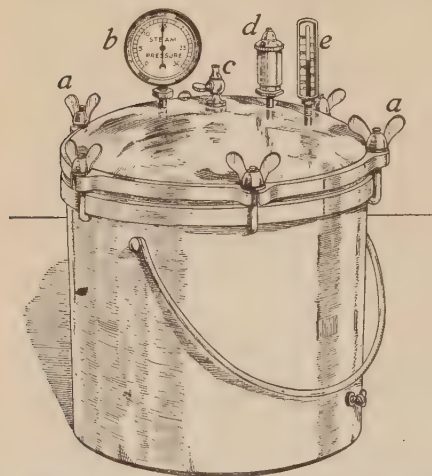


FIG. 80. A canning outfit such as is recommended by the bacteriologists of the United States Department of Agriculture. With it the cans are sealed airtight and then heated under steam pressure. This kills all bacterial spores and removes the danger of food poisoning.

of the throat which makes swallowing and talking difficult. The temperature becomes subnormal, and the pulse, which is at first quite slow, rises until it may reach from 130 to 160 beats per minute.

These cases are very serious, and the sooner a physician is called the better for the patient. Antitoxin is the only effective treatment, and, as in all antitoxin treatments, it is vitally important that this be given early. If this is done, the development of the more serious symptoms may be prevented. If the later symptoms develop, recovery is sometimes quite slow, the time extending to two or three months.

about forty-eight hours these symptoms are followed by constipation and acute nervous symptoms. There is disturbance of vision, such as dimness of sight and paralysis of the muscles of the eyes. Distant objects cannot be seen. There is a difference in the size of the pupils of the two eyes, an intolerance of light, and nervous rolling of the eyes. All these are unmistakable symptoms of botulism. There may be extreme muscular weakness, and a constriction in the muscles

The toxin of *Bacillus botulinus* is deadly, and food that is suspected of being infected with this germ should not even be tasted. Usually such food has a soft consistency and a sour smell. The toxin is destroyed by heat, and after suspected food has been thoroughly boiled it is safe to eat it, provided this is done at once. It is not safe to eat such food after it has been kept for a time after heating; for the bacillus forms spores that are not killed by the temperature of boiling water and these spores will germinate and again form toxin in the food. The temperatures used in commercial canning are high enough to kill not only the ordinary vegetative form of the germ but also the spores. Foods bought in cans are much safer than those canned at home, unless a steam-pressure boiler and sealed tin cans have been used in the home canning. The cold-pack method of canning meats and vegetables has proved dangerous and should not be employed.

QUESTIONS

1. What is appendicitis?
2. What are the symptoms of acute appendicitis?
3. What should be done in a case of acute appendicitis? What should not be done?
4. When is the best time for an operation for chronic appendicitis?
5. Distinguish between the two kinds of food poisoning.
6. What are the symptoms of botulism?
7. Why is it necessary that the treatment be given early?

CHAPTER FORTY-ONE

TREATMENT OF BURNS

FORMERLY extensive burns were a great problem to the physician. The patient suffered intensely, if the burn was a large one. He was likely to die of shock or from toxins absorbed from the wound, and if the patient did recover he was often handicapped by serious deformities or disfiguring scars. Because of the seriousness of the problem, medical investigators set themselves to the discovery of better ways of treating burns, and their studies in this field have been richly rewarded. We now have several methods of treating severe burns that give really wonderful results.

Burns and scalds. A burn is an injury made by dry heat, while a scald is one inflicted by steam, hot water, or oil. Burns and scalds are divided into three classes according to the degree of injury. These three classes are: (1) those which merely redden the skin; (2) those deep enough to blister; and (3) severe burns and scalds that injure the deeper tissue.

Although burns of the first two types may be quite painful, there is no danger from them unless a large area of the skin is injured. In case of a large burn of the second class or of a burn of the third class, a physician should be called immediately.

General first-aid treatment for burns. Remove the clothing at once with extreme care, cutting it wherever necessary, to prevent tearing the flesh or skin, and wetting any part that sticks with a solution of boric acid, weak solution of sodium bicarbonate (baking soda), or normal salt solution.

A scald or a burn caused by dry heat is best relieved by a watery solution made of borax, soda, Epsom salts, or milk of magnesia. Cover the surface with a soft, clean compress of linen or gauze saturated with the solution and keep the dressing wet. Oil dressings are not now considered advisable for first dressing on most burns. There is the possibility of infecting the wound, if the oil is not sterile, and a dressing of this type

may interfere with the after-treatment, as neither paraffin nor tannic acid can be applied on an oily surface.

Burns made by electricity are best treated with oil. A burn made by acid or alkali must be treated according to the nature of the solution which has caused it. Carbolic acid or creosote burns should be washed with alcohol, as this neutralizes the effects of these agencies. Other acid burns should be dressed with alkaline solutions such as limewater or a solution of baking soda. Burns caused by alkalis, such as caustic soda, caustic potash, or ammonia, should be treated with boric acid, vinegar and water, or lemon juice and water.

A burn is often followed by a condition of shock or collapse. The face may become pinched in appearance, the pulse weak, and the body cold. To relieve this, apply heat to the feet and give aromatic spirits of ammonia or other stimulant (page 348). Sometimes there is suppression of urine; so the patient should be watched to see that the urine is voided after an injury of this kind.

After-treatment of burns. In the after-treatment of burns the physician's first thought is the health of the patient, but in addition to this he should have three objectives. These are the care of the injured tissues, prevention of scars, and the return of the function of the part injured.

To reach these three objectives, surgeons make use of several different methods, such as the warm salt bath, dry heat with no dressing applied to the burned surface, the tannic acid and paraffin treatments, skin grafting, surgery, and physiotherapy.

Salt bath and dry heat treatment. In the salt bath treatment the patient is placed in a padded tub filled with a 5 per cent solution of warm salt water. The soothing effect of the water relieves the pain, quiets the nervous condition, and causes the patient to relax so that the wounds can be cleansed and the treatments given with little pain. If the patient is first placed in the salt bath, clothing or dressing that is sticking

to the burned surfaces can be removed with a minimum degree of discomfort.

In some cases this bath is given continuously. Either additional warm salt water is constantly added, or a tub that permits a continuous flow of warm water is used. In other cases the bath is continued for two or three hours only. Then the burn is dressed with a lightly applied dressing of salt solution, tannic acid, or some other solution.

Treatment by dry heat and no dressing is used by some surgeons. In this method the patient lies under a covered frame which has electric lights strung along its top, well above the patient. At intervals the frame is lifted to permit the burned parts to be washed off by pouring salt solution over the wounds. Then immediately the frame is placed over the patient again to apply the heat and exclude the air.

During treatment by either of these methods the patient is encouraged to change his position, as the movement helps in preventing the contraction of scar tissue.

Treating burns with paraffin. A change in the method of treating burns was brought about by the World War. Before the war the method of treating them with paraffin, first used in France by Dr. Barthe de Sandfort, had been used by a few physicians in this country, but had not been generally practiced. It was used in France in hundreds of cases during the war and gave wonderful results, the burn, even when extensive and deep, healing quickly and with little pain to the patient. A burn healed by this method leaves practically no scars or deformity. It has also been useful in treating wounds where a large amount of skin has been removed.

Preparing the burn for paraffin dressing. No oil, flour, or grease should be applied to a burn upon which paraffin dressing is to be put. It is necessary to have the surface of the wound clean before the dressing is applied, and it is difficult to clean oil or powder from a wound. Keeping the burn under water will relieve pain until the dressing can be put on.

The surface of the burn must be cleaned, and if necessary must be washed with green soap, boric acid, or salt solution. While doing this, care must be taken not to infect the wound, not to injure the raw surface, and not to wipe off any small particles of healthy skin which may have escaped burning. It must then be thoroughly dried. This is most easily done with an electric hair drier. If this is unavailable, the surface may be dried with folds of warm gauze or filter paper and fanned with a clean towel or fan.

Preparing and applying the paraffin. The paraffin must be melted; this is best done in a double boiler. Great care must be taken to keep water from getting into the fluid, as this water will burn when the paraffin is applied. It must be brought to a temperature of from 140° to 150° F., and sprayed over the wound with an atomizer. The atomizer should be heated before the fluid is put into it, and kept at an even temperature. Atomizers for this purpose are made, which are like double boilers with a second receptacle for water. If one of these is not available, an ordinary atomizer may be used. This can be heated by immersing it in hot water, care being taken not to break it; or the paraffin can be painted on with a camel's-hair brush (rubberset). When using a brush, the greatest care must be taken not to injure the surface of the wound or to give pain. The fluid paraffin should be dabbed on, not brushed, and it should not only cover the wound, but extend slightly beyond it on the unburned skin.

After the first layer of paraffin has become hard, it must be covered with a thin layer of absorbent cotton, and over this a second coating of the fluid paraffin should be sprayed. After this coat is set, a gauze dressing is put on, and all is held in place by a gauze bandage. Burns dressed with paraffin should be re-dressed at least once in the first twenty-four hours, and later at intervals of two or three days. To remove the dressing, cut through the paraffin outside of the wound, and press or roll the edges back. The part over the wound is then easily removed.

With this dressing the burn is protected from the air, the new skin is protected against injury, the hardened wax, acting as a splint, keeps the injured part in position and thus prevents deformity, and the heat from the application brings the blood to the surface of the wound and increases the flow of lymph. Pain is relieved as soon as the dressing is applied and the growth of new skin is stimulated. Recovery takes place in a much shorter time when this treatment is used, and more extensive burns are cured by it than by former methods.

Tannic acid treatment of burns. Tannic acid is used by a number of surgeons for dressing burns of the second and third degree. It is used at a strength of 2.5 to 5 per cent, and is sprayed directly upon the burn. It is an astringent and disinfectant; it forms a coating over the surface of the burn; it lessens the pain and the absorption of toxic substances from the wound; and it protects the surface of the burned area. The application should be renewed at frequent intervals for the first twenty-four hours until the color of the wound becomes brown. It cannot be used if the first-aid treatment of the burn has been an oily dressing.

First-aid treatment of a burn should always depend upon the facility and promptness with which surgical treatment may be obtained, but because neither of the two latest accepted treatments for burns, that of tannic acid and paraffin, can be applied immediately after an oil has been used, a liquid solution is best for first aid. Tea is one of the solutions which are effective, but it is seldom at hand at the time of the emergency.

Skin grafting. When only a small area of the skin has been burned off, it is soon covered by new skin which has grown out over the burned surface from the skin at the edges of the wound. If a large surface is without skin, it is necessary to start new growth by transplanting particles of skin at intervals over the burned surface. These skin grafts are as a rule taken from some healthy part of the patient, but may be obtained from a second person if the blood is of the same type (see page 154).

From these particles of skin, new skin will grow and gradually cover the burned surface. This work must be done by the surgeon and is done under the most careful asepsis.

Prevention of deformity from scar tissue or stiff joints is a most essential part of the surgeon's treatment. From the very first he keeps this in mind, watching the joints to prevent flexion deformities, or contraction of scar tissue, using splints when they are needed, exercising the joints at the time of the dressings, or operating upon the scar tissue when necessary.

Most surgeons of today turn these cases over, as soon as treatment can be borne, to a physiotherapist, who massages around and over the scars to prevent adhesions and gives the necessary exercises to correct flexion deformities. These treatments may be slightly painful at first, but the results justify the discomfort. Cases that receive proper treatment are much less unsightly, as in time the scar loses its inflamed appearance, and when there is freedom from adhesions there is practically no deformity.

Injuries from burning clothing. A surprising number of severe burns are from burning clothing, and a knowledge of both how to prevent these fires and of how to deal with them is important.

If your own clothing takes fire, *lie down*. The greatest danger is from inhaling the flame; so do not stand up and allow the flame to come up around your face. If there is a rug, blanket, or heavy coat near, wrap yourself in this to smother the flame. If there is nothing of the kind at hand, roll over and over.

If the clothing of another person takes fire, throw her to the floor and wrap her in a rug or blanket. The person coming to the rescue must take care that her own clothing does not take fire, if she is wearing a thin gown. In all cases try to protect the face from flames. If it is necessary to enter a burning building or pass through a hallway that is in flames, the face should be protected with a blanket or coat (wet if possible).

Cotton-flannel bathrobes or jackets should not be worn near a fire or a gas flame, as a flame started among the fibers on the surface will very quickly run over the gown. Light dresses should not be worn near an open fireplace, where a sudden draft may sweep them into the flames. Inflammable fluids or materials should never be used where there is an open flame of any kind, and preferably not used at all in the evening.

Cleaning with naphtha and gasoline, if these are used, should be done in the open air. Even then there may be an explosion from an electric spark generated by rubbing of the clothes, and in the explosion the clothing may be drenched with burning gasoline. A much less inflammable cleaning liquid is now made, and this should be used instead of the more dangerous ones.

If a gasoline stove causes a fire, do not try to put out the flame with water, as the gasoline will rise to the top of the water and spread the fire; use flour or smother the flame with a blanket.

QUESTIONS

1. Into what three classes are burns divided?
2. What kind of burns are dangerous?
3. Give the general first-aid treatment for burns.
4. With what should a burn made by electricity be treated? a burn made by an acid? by an alkali?
5. What should be done in a case of shock from a burn?
6. Describe the salt bath treatment of burns; the dry heat treatment; the treatment with paraffin; the tannic acid treatment.
7. Why and how is skin grafting done?
8. How are deformities prevented?
9. In case your own clothing takes fire, what is the proper action?
10. What should you do if another person's clothing is on fire?
11. Explain some ways of preventing clothing fires

CHAPTER FORTY-TWO

TREATMENT OF SOME OTHER INJURIES

THE injuries we shall discuss in this chapter are not common. The treatment of them is given because some of them are serious and because they may demand immediate attention in a place where no doctor can be had. In all of them the effectiveness of the treatment is in direct proportion to the promptness with which it is administered.

Snake bite. There are few poisonous snakes in most parts of this country, and an emergency from snake bite is rare. When it does occur, quickly tie a handkerchief or a strap above the wound tight enough to stop the circulation and keep the poison from being carried through the system. Then cut lengthwise of the limb through the wound made by each fang, and let the blood flow freely. Sucking the wound will draw out the poison, and is not dangerous unless the skin of the mouth is broken. Exercise and whisky increase the circulation and should be avoided.

The only effective treatment for snake bites is antivenins. These are made in the same way as antitoxins. They are secured by injecting horses with gradually increasing doses of venom and, when the blood becomes strong in the antivenin, bleeding the horse and concentrating the serum. Different kinds of antivenin must be used, according to the species of snake by which the patient is bitten; but a polyvalent serum effective against the venom of the copperhead, the cottonmouth moccasin, and the rattlesnakes may be purchased. It is not effective against the bite of the coral snake which is found in our far South.

As in the use of all antitoxins, it is important that the treatment be given early. In a region where there are poisonous snakes, a supply of the antivenin should be kept somewhere close at hand. The serum must be fresh enough to be effective,



Courtesy Antivenin Institute of America, Glenolden, Pennsylvania

FIG. 81. An antivenin outfit for use in cases of snake bite. The essential points in the treatment are that the wound be cut open to allow free bleeding, that a tourniquet be placed about the limb to prevent the poison from being carried through the system, and that antivenin be administered as quickly as possible.

and it must be stored where it is cold to prevent rapid deterioration. Unless a physician can always be secured quickly, it is well to know exactly where antivenin can be obtained and exactly how it is to be used.

Treatment of dog bites. The bite of a dog may or may not be dangerous. The wound should be cleansed at once with bichlorid of mercury, carbolic acid, or some other effective antiseptic, and ammonia applied. If the dog is sick, or if there is any reason to suspect hydrophobia, a physician should see the patient as soon as possible. Meantime the wound should be kept open and be allowed to bleed freely. To keep the virus from being taken up by the blood into the body, a tight bandage should be applied between the wound and the body, but it should not be kept on longer than forty-five minutes. If a physician cannot be promptly reached, the wound should be cauterized with strong carbolic acid, nitrate of silver, or a hot iron.

The dog should not be killed unless it is absolutely necessary to do so to keep him from biting other people, but should be

shut up and watched for symptoms of rabies. If the dog remains alive, there will be no reason to worry. If it develops rabies, the animal must be killed, without injuring the brain, and the head sent to a laboratory for examination. Many unfortunate persons have suffered indefinitely from nervous apprehension of hydrophobia, after having been bitten by a dog not positively proved to be mad, because the dog was killed immediately.

Hydrophobia. The 'germ of hydrophobia or rabies has not been positively identified, but the disease can be produced by inoculation with a piece of the spinal cord or brain, or with the saliva of a diseased animal. Sometimes the saliva of a dog is infectious before symptoms of the disease appear.

The onset of rabies is gradual, beginning frequently with pain and congestion in the wound, mental depression, irritability, and increase in sensibility in the special senses. This may be followed by difficulty in swallowing, and then convulsions. There is severe pain in the throat, breathing becomes labored, and there may be foaming at the mouth and partial or complete paralysis.

The prevention of the development of this disease in persons who have been bitten by rabid animals is largely dependent upon the extent of the injury and the promptness with which the Pasteur treatment is given. The incubation period is never less than two weeks and may be as long as a year, and if the Pasteur treatment (in which the patient is repeatedly vaccinated against the germ) is begun in time, the development of the disease can almost always be prevented. It may be added that there have been very fair imitations of hydrophobia due to the nervous terror of the disease and brooding over the symptoms. The best plan is to do everything possible to avert the danger and then believe it past.

Poison ivy or poison oak. Poisoning by this vine is caused by an oil secreted by it. Except with very susceptible persons, poisoning is caused only by actual contact with the plant.

Careful search should always be made before settling upon a picnic or camping ground, to make sure that this plant is not present. If one has touched the vine or the rash appears, the part of the body affected should be washed with hot soap and water to remove the oil. Laundry soap that contains naphtha is more efficacious than toilet soap. If the washing is done promptly, it should remove the oil and prevent inflammation. Washing with alcohol, gasoline, or kerosene is even more effective than soap, but an abundance of the liquid should be used so that the irritating substance will be dissolved and removed and not spread on the skin. This washing should be done promptly after exposure to the poisonous oil, so that it will be removed before the skin is injured.

After inflammation has appeared, bathe the parts frequently with a solution of sodium bicarbonate or borax. Some physicians advise leaving the parts uncovered, some that cloths wet in the solution be kept over the inflamed parts. All blisters of any size should be opened. Make the opening along the edge and catch the fluid in absorbent cotton, not allowing it to flow over the skin.

Other remedies recommended are sugar of lead solution, potassium permanganate solution, and a 5 per cent solution of ferric chlorid. The last two are supposed to oxidize the oil and so destroy its poisonous properties. They must be



FIG. 82. The poison ivy is often mistaken for the Virginia creeper. The Virginia creeper has five leaves, while the poison ivy has only three.

applied promptly, before the harm to the tissues has been done. They are preventives rather than remedies, although, like thorough washing in alcohol or gasoline, they may be useful after inflammation has begun.

Physicians can immunize patients against the poisonous substance of the plant.

QUESTIONS

1. Give the treatment for snake bite.
2. What treatment should be given and what steps taken immediately after a person has been bitten by a dog?
3. How would you treat ivy poisoning?

CHAPTER FORTY-THREE

METHODS OF TREATING WOUNDS

A WOUND is an injury in which the skin has been broken. Such injuries are classified as *cuts* or *incised wounds*, *torn* or *lacerated wounds*, and *punctured wounds*. There are two serious dangers from wounds: the danger of loss of blood and the danger of infection, of which the latter is by far the more common and more serious. Unless a wound is very severe the bleeding stops of itself before any great amount of harm is done, but infection even of a most insignificant wound may cause a sore or develop into tetanus (lockjaw). The severity of a wound depends on its extent and on the degree of hemorrhage from it.

In using a knife or any other sharp instrument, one should take care to have it clean and not to cut toward the hand. Nails, especially rusty ones, should never be left where they may tear the skin. Bandages and dressings should be kept in a clean drawer by themselves, and if possible in a sealed package or a tight box, so that no dust can get at them; and everything likely to be needed for dressing a cut should be in one place and in order. If the knife is clean and the wound promptly bandaged, even a severe cut will usually heal easily.

Small cuts. A small cut should be allowed to bleed for a few minutes, as this helps to carry off dirt and bacteria. Then sponge out the wound with a dilute solution of carbolic acid, or alcohol. Alcohol stings for the moment, but a wound dressed with it heals quickly. Wrap the injured part with a clean piece of gauze or old linen wet with the disinfectant. Iodin, mercurochrome, and hexylresorcinol are good disinfectants and can be painted right over the wound. Peroxid of hydrogen is little used now, for although it cleans the wound, it injures the tissues and delays the healing process. Unless the opening is large enough to allow it to bubble out freely, it

will force the dirt into the tissue. If the bleeding is too free, apply the bandage tightly, but when it has stopped, loosen the bandage, as it is better not to cut off the blood supply.

When far from a doctor, use adhesive plaster to close a long cut. Put several long, narrow strips over sterilized gauze, but never bring it in direct contact with the wound, for it is not free from germs and may result in infection. Collodion and "new skin" are prepared with ether, which is a disinfectant, and can be applied directly to a wound.

Punctured wounds. A punctured wound is one made by a sharp-pointed instrument or a bullet. There is always danger of infection in such wounds, as the outlet is small and the wound is hard to clean and drain. There is no other serious danger unless the weapon or bullet pierces a blood vessel or organ.

If the puncture has been made by a stable fork or a nail, one should watch carefully for fever or symptoms of infection, as there is always danger from the tetanus germ. A surgeon should be called at once to cleanse the wound and if necessary administer anti-tetanus serum (antitoxin). This is almost a sure preventive of the disease if used promptly when the injury is sustained.

Lockjaw or tetanus is caused by a germ which is most often found in soil, especially in manure. It develops most readily in a deep, punctured wound into which dirt and other foreign particles have been carried. Wounds made by dirty, rusty nails or by stable and garden tools are especially likely to contain this germ. A large percentage of cases among children are caused by wounds from toy pistols, torpedoes, fireworks, and firecrackers. It is thought that this is due to the fact that a wound from these is deep and that dirt and germs are carried in from the skin. The period of incubation is usually from six to fourteen days, but may vary from four days to three weeks.

In mild cases there is little fever, but in severe cases the temperature may reach from 103° and 105° to 110° . The

muscles of the head and neck are the first to be affected, gradually becoming rigid. The rigidity then spreads over the body, frequently accompanied by spasmodic contractions of the muscles and convulsions in which the body is arched backward, until in severe cases the patient may rest upon his head and heels. These convulsions are brought on and intensified by a noise, a touch, or an excessive glare of light. The patient may die of suffocation because of the rigidity of the respiratory muscles.

If symptoms of the disease are observed, a physician should be called at once and tetanus antitoxin injected. The wound should be opened well, allowed to bleed, and thoroughly cleansed and drained. The patient should be kept quiet and in a dark room. Bromids and other quieting medicines are given, and to check the convulsions chloroform is sometimes used. Feeding is done through the nose or by enema. It should be emphasized, however, that there is no effective *treatment* for tetanus, and that the use of antitoxin as a *pre-ventive* should in no case be neglected when wounds that are likely to favor the development of the germs have been received.

Lacerated wounds. In a lacerated wound the tissues are torn by a blow from a blunt instrument or in some other way. The chief danger from such a wound is that of infection. The wound should be carefully cleansed, and the methods already described used to prevent infection.

Hemorrhage from wounds. Hemorrhage does not depend on the size of the cut, but on the number and size of blood vessels that have been injured. One of the worst cases of collapse from hemorrhage that I ever saw was that of a man who had a cut in his scalp less than an inch long. An artery had been cut, and he had been brought from a long distance to the hospital, without any attempt having been made to check the bleeding. There are three kinds of hemorrhage, and it is most important to be able to recognize each kind. They are:

(1) Arterial hemorrhage, in which the blood comes from a cut artery. It may be recognized by the blood coming in jets or spurts. This is the most dangerous, because, owing to the force of the heart pumping it out, the blood escapes rapidly.

(2) Venous hemorrhage, in which the blood comes from a vein and flows in a slow but steady stream.

(3) Capillary hemorrhage, which is the oozing of blood from the wound.

How to stop a hemorrhage. As soon as bleeding begins, Nature uses her own method of checking the flow, by forming a clot of blood at the end of the cut blood vessel. If the bleeding is not too strong, this is done. Our first effort, therefore, must be to aid Nature by keeping the patient quiet and cutting off the flow of blood, so that the clot shall not be dislodged. The pressure must of course be upon the walls of the blood vessel on the side of the wound from which the flow is coming. In arterial hemorrhage the blood is coming from the heart, so that pressure must be between the cut and the heart. In venous hemorrhage the blood comes from the extremities and is returning to the heart; therefore the pressure must be on the side of the cut away from the heart. The veins have valves at intervals to prevent the flow of blood in the wrong direction. The vein will, therefore, when pressure is applied, become empty up to the nearest valve. In case of a large vein it is well to put compresses on the two sides of the cut, or one large compress immediately over the cut. If the bleeding is from capillaries, a firm dressing or bandage is all that is necessary. Cold water tends to check the flow of blood; warm water does not.

As soon as hemorrhage has been stopped, dress a severe wound as you would a small one, with sterile or disinfected gauze, and get a doctor as soon as possible to put in the stitches that may be needed.

Internal hemorrhage. If there is reason to suspect that an internal hemorrhage is taking place in one of the cavities of

the body, keep the patient absolutely quiet, as restless movements may dislodge the clot that may be forming in the end of the broken blood vessel. Send for the doctor at once. In case of abdominal bleeding, put an ice bag on the abdomen, raise the foot of the bed, and take away the pillow. The temperature will drop below normal, and one must guard against shock.

Compresses. A compress is a folded piece of cloth used to create pressure. It is usually made of gauze, but in an emergency can be made with a handkerchief or several handkerchiefs or any other soft material which can be folded. A cork or a chip wrapped in a piece of muslin will answer.

The compress is put over the artery or veins and bandaged firmly in place. The bandage can be tightened by slipping a pencil inside it and twisting until the compress is pressed against the artery hard enough to stop the bleeding. The blood flow could be stopped as effectually by pressure with the thumb, but such pressure could not be kept up for an indefinite time, because the hand would become so fatigued as gradually to loosen its hold.

Tourniquets. A tourniquet is a strap used to wrap around a limb to stop bleeding. In hospitals tourniquets made of leather or of elastic are used, but in an emergency any strong strap of any material, a bandage, a handkerchief, anything that can be tied around the part, will do. A tourniquet should be made very tight, which can be done by twisting it close with a stick or pencil. It should not be left on for more than fifteen minutes, as it cuts off the blood supply from the extremity and may cause an unhealthy condition of the part, or even in some cases gangrene. The part of the body below a tight bandage or tourniquet should be kept under observation, and if it becomes cold, swollen, or discolored, the bandage should be loosened and the blood allowed to flow into the extremity. If, with the removal of the bandage, the hemorrhage begins again, press on the cut vessel with the finger

until the blood has had a chance to flow into the limb, and then replace the tourniquet. A wound that bleeds so freely as to require a tourniquet should be treated by a surgeon as soon as possible.

The Carrel-Dakin method of treating infected wounds. During the first months of the World War it was found that the infection of wounds was a great problem and that a large percentage of the deaths and deformities among wounded soldiers was due, not to the wounds themselves, but to the bacteria infecting them. During the summer and autumn of 1914 it seemed impossible to control infection, despite every effort made both in the first dressing and in the after-treatment at hospitals. Shells and bullets damaged the tissues horribly, carrying dirt and bacteria into the wound, and if there was any delay in getting the wounded man to the hospital the wound would be in a dreadful condition before thorough treatment was possible.

In 1915 Dr. A. Carrel of the Rockefeller Institute and Dr. H. D. Dakin of the Herter Laboratories, both of New York City, working at the laboratories established by the Rockefeller Foundation at Compiègne and at Temporary Hospital No. 21, Service du Santé Militaire, developed antiseptics and methods of their application which have been successful in the treatment of infected wounds. The treatment prevents or stops supuration, and allows closure of the wound. The method embraces four essential parts: (1) mechanical cleansing, (2) chemical sterilization, (3) bacteriological control, (4) closure of the wound. The antiseptic used is a sodium hypochlorite solution, Dakin's solution, which contains between 0.5 and 0.4 per cent sodium hypochlorite and which is not alkaline to powdered phenolphthalein. The technique of applying the antiseptic involves special apparatus consisting of a graduated glass reservoir connected through rubber and glass connecting tubes to small rubber distributing tubes. These tubes, which are perforated with small holes, are so placed

that the antiseptic solution is brought in contact with every part of the wound. Gauze compresses are placed over and about the tubes, and the whole is covered by a pad of cotton and gauze. The surrounding skin is protected from the irritant action of the solution by vaselin compresses or by zinc oxid ointment. The wound is dressed once a day, and the antiseptic solution is instilled into the wound every two hours, day and night.

The results from the use of this treatment under war conditions were wonderful. Wounds were quickly cleansed of infection and healed in from one half to one third less time than formerly. The danger of secondary hemorrhage was lessened, and the patient recovered quickly. The number of amputations decreased, and when amputation was inevitable, the stump was clean and healthy and an artificial limb could be used much sooner than formerly. Because of the quick recovery of the patients their stay in the hospital was shortened and their beds were quickly given up to others, so that many more could be treated with the same equipment. So exact was the technique of this work as done under Dr. Carrel, and so certain the results, that a system of calculation was worked out by which in most cases, knowing the extent of the wound and the age and condition of the patient, it could be estimated to a day when he would be convalescent.

Since the war this treatment has been and still is used in hospitals for the treatment of badly infected cases, and it gives excellent results. Microscopic examination of the wound shows an almost marvelous disappearance of bacteria. When it is found that all bacteria have disappeared from the tissue, the wound can be sewed up, and it will heal with good muscle and practically no scar.

As Dakin's solution deteriorates when exposed to heat and light, it must not be used hot and should be kept in the dark. It does not keep well and must be constantly renewed. Owing to these facts and to the care with which it must be prepared,

it is gradually going out of use, although it is still believed to be an excellent disinfectant.

Many so-called substitutes are sold in the drug stores, but they are not the same nor are they of the same value.

QUESTIONS

1. How are the different types of wounds described?
2. Why should a small wound be allowed to bleed? Describe the method of dressing it.
3. What is the danger from a punctured wound?
4. What is tetanus? How is it prevented?
5. How is the hemorrhage from a vein distinguished from one from an artery?
6. How is a hemorrhage from an artery checked? from a vein? from the capillaries?
7. Give the treatment for an internal hemorrhage.
8. Describe the correct use of a tourniquet.
9. What is the Carrel-Dakin method of treating wounds?
10. What are the effects of the treatment?

CHAPTER FORTY-FOUR

DISLOCATIONS, FRACTURES, AND BANDAGES

A **DISLOCATION** is the slipping of a bone from its socket, often accompanied by the breaking and tearing of the ligaments which hold it in place; a fracture is the breaking of a bone. In either case the sooner the patient is in the hands of the surgeon the better. Delay may not only increase the suffering of the patient but interfere with recovery, or even result in permanent injury.

Dislocations. A dislocation can be recognized by the appearance of the joint. If there is any doubt about its proper appearance, compare it with the joint on the other side. Sometimes the head of the humerus (arm bone) can be felt to be out of the socket. Pain in the joint and loss of freedom of movement are indications of dislocation. In some persons a dislocation occurs very easily and should be guarded against.

There is likely to be contusion and swelling around the joint, and if the swelling becomes too great before the bone can be put into its place it is difficult to handle it. Place the patient in as comfortable a position as possible, not moving the limb more than is absolutely necessary, and then, to prevent swelling, apply cold or hot and cold compresses. Usually only a physician should attempt to put a dislocated bone back into place.

Fractures. A fracture may be *simple*, *compound*, *comminuted*, *impacted*, or *greenstick*.

A simple fracture is one in which the bone is broken, but in which there is no opening through the skin.

A compound fracture is one in which the skin is pierced by the end of the broken bone.

A comminuted fracture is one in which the bone is broken into many pieces.

An impacted fracture is one in which the two ends of the bones have been forcibly driven together.

A greenstick fracture is an incomplete fracture, and is common in children, whose bones, not being brittle, do not in many cases break completely.

Treatment of simple fractures. A simple fracture, if not handled carefully, can easily become a compound one. If it is not possible to reach a physician promptly, it is best to move the patient as little as possible. Leave him where he is and make him as comfortable as you can. If it is necessary to move the limb, support it well at the sides of the fracture. If the patient has to be moved, a temporary splint should be put under the limb. The splint is a support, and can be made of whatever is at hand — a pillow tied firmly around the leg with strips of muslin, a bag stuffed with hay, a piece of heavy pasteboard, a piece of stick on each side of the broken limb, or coats rolled into a tight wad. In putting on the bandage, be careful not to make it tight enough to stop the circulation.

Treatment of compound fractures. A compound fracture is treated like a simple one, with the additional point that the open wound must be taken care of. If there is profuse bleeding, it must be checked and care taken not to infect the wound. Dress it with clean gauze as you would any other open wound, and watch the patient for symptoms of shock.

Sprains. A sprain is caused by severe wrenching of the ligaments around a joint, most commonly in the wrist or the ankle. The treatment should be given as promptly as possible. If the injury is in the ankle, remove the shoe, apply hot or cold water, or both alternately, — as hot and as cold as can be endured, — putting the foot into first one and then the other for fifteen to twenty minutes. Then elevate the foot to lessen the swelling. If the sprain is slight, the foot should be allowed to rest for several hours, and then used moderately to prevent stiffness. If the injury is severe, a surgeon should be called. There is a growing disposition to strap the foot and leg with

adhesive plaster and allow the foot to be used. Massage is beneficial, but should be given in the proper manner, not too heavily at first. There should be passive exercises as soon as they can be borne.

Strains. A strain is caused by overstretching a muscle — sometimes slowly in lifting a heavy weight, sometimes quickly from a sudden jerk. It is not as serious an injury ordinarily as a sprain. The treatment is about the same as for a bruise or a sprain — rest, hot or cold applications, and rubbing.

Bruises. The discoloration in a bruise is from the breaking down of a number of little blood vessels in the tissue under the skin, by injury through a blow or a fall. The discoloration may be caused by a blow so slight that we are not conscious of it; usually such a bruise needs no treatment. If it is on the face, where it will be unsightly, it can be treated by applications of alcohol, vinegar, witch hazel, ice water, or cold water, any of which will cause the blood vessels to contract and check the escape of blood into the tissues.

If the blow has been a severe one, use these same remedies to ease pain and allay inflammation, and keep the injured part raised to lessen the blood supply. When the acute inflammation subsides, massage will help to take out the soreness and quicken the absorption of the blood in the bruised part. If the injury is followed by shock, there may be more serious complications, and a physician should be called. In the case of a severe bruise, it is well to have a thorough examination, to make sure that there is not a fracture. As in all conditions in which a fracture is suspected, the examination can be best made before swelling and stiffness have set in.

Bandages. Bandages are used to keep dressings and splints in place; to make pressure to stop bleeding; to give support; and to protect injured parts against knocks or blows. The two most commonly used are the triangular and the roller bandage.

The triangular bandage. The triangular bandage can be conveniently used when it is necessary to hold dressings in

place. As a rule it is made of stout unbleached muslin, but any strong material will do; muslin from sheets or clothing, or a large handkerchief, may be used. The bandage can be folded into a wide or a narrow strip, or can be used in the triangular form. The usual size for it is that of the triangular half of a yard of material, but sometimes, in an emergency, a piece as large as this cannot be obtained. There are certain rules for applying this bandage, but one must plan somewhat according to the size and the part to which it is to be applied. The following



FIG. 83. The triangular bandage on the head.

instructions will help in fitting the triangular bandages on some of the parts of the body on which it is commonly used :

Bandaging the head. When the bandage is large, place it over the head, with the middle of the folded edge well forward on the forehead and the point hanging down the back. Bring back the two ends, which hang down the side of the head, and cross them well down at the back; then bring them around to the front and tie them on the forehead. Turn up the point in the back and fasten it with a pin. The ends of the bandage are tied in front, so that there will be no knot under the head when the patient is lying down.

When the bandage is small, put the point in front and the middle of the bandage at the back; tie the ends in front and

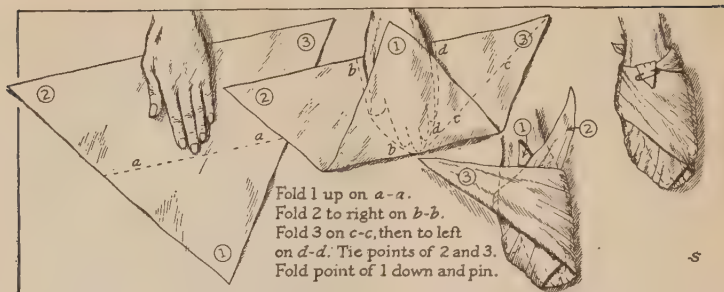


FIG. 84. How the triangular bandage is applied to the hand.

turn the point which is hanging over the face up over the knot and pin it with a safety pin.

As has been stated, the standard size of the triangular bandage is that of the triangular half of a square yard of cloth. Smaller sizes are made by using smaller squares of cloth. A convenient size for use on the hand is made from an eighteen-inch square.

Bandaging the hand and foot. Lay the hand on the bandage, with the palm down and fingers toward the point; fold the point up over the back of the hand; wrap the two ends around the wrist and tie them. Figure 84 shows how the hand should be laid on the bandage and the bandage folded, tied, and pinned.

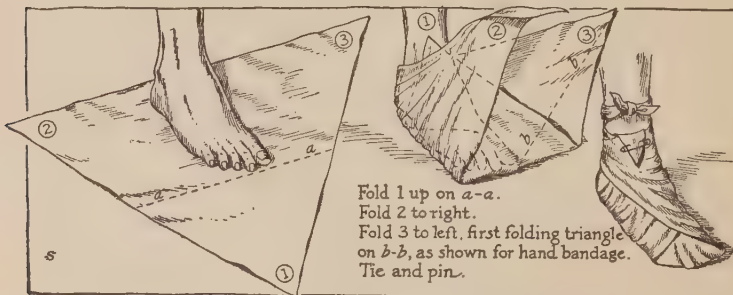


FIG. 85. How the triangular bandage is applied to the foot.

Bandage the foot like the hand, after placing it on the bandage with the toes toward the point.

The arm sling. Let the point of the triangle come out beyond the elbow. The end running under the arm goes across the chest to the side of the neck away from the injured arm; the other end goes around the neck on the side of the injured arm; and the two ends are then tied around the neck. Lastly, the point is brought up around the elbow and pinned. (Refer to Figure 86 above.)



FIG. 86. The triangular bandage used as an arm sling.

Triangular bandage folded. When the triangular bandage is folded with the point in, it can be used for eye, jaw, hand, or wherever a narrow bandage is needed.

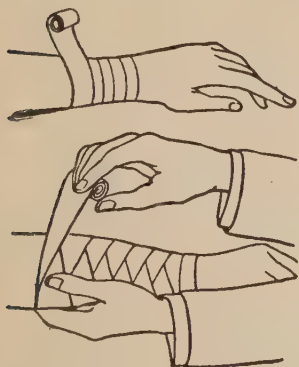


FIG. 87. A roller bandage on the wrist, and the method of reversing a bandage.

The roller bandage. The roller bandage is made of gauze, flannel, muslin, crinoline, or rubber, according to the purpose for which it is designed. In an emergency any material that is pliable and strong can be used. The bandage is torn into different widths according to the part of the body to which it is to be applied. The usual widths are: for a finger, three fourths of an inch; for arm and head, two and one-half inches; for leg and thigh, three inches; for chest and abdomen, four to five inches.

A roller bandage is much harder to apply neatly than a triangular one, but a little practice will make one skillful in its use. Certain points must be observed. Apply the bandage firmly and evenly, but be careful not to have it too tight. After an injury, put on a loose bandage to allow for possible swelling.

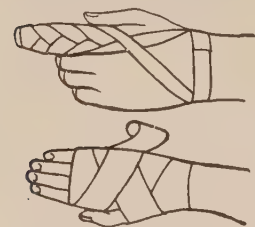


FIG. 88. A roller bandage on the hand and foot.

The circular method of applying a roller bandage is the easiest, and when used to hold a splint in place is the one generally employed. Gauze and flannel bandages can be used best in this way, as they are pliable and soft. A circular bandage will not be even in pressure if the surface to be covered is larger in one part than in another, and to make the bandage lie flat and even we use "reverses" and "figure eights."

The reverse is made in this way: With the roll in the right hand, press the thumb of the left on the lower edge of the bandage and hold it in place; loosen the pull of the right hand on the bandage and make a quick turn of the roller toward you, making a fold before taking it again under the limb. When several reverses are made, they should form a line up the limb.

The figure-eight bandage is used to cover joints. To apply it, fix the end of the bandage by several circular turns below the joint; carry the bandage up and make the circular turns immediately over the joint; next make a turn a little below the joint, overlapping well the bandage covering the joint;

then a turn under and next above the joint, overlapping above as was done with the one below. Continue in this way, going first below and then above, until well above and below the joint. When the point of the joint does not need to be covered, omit the two turns immediately over the joint.

QUESTIONS

1. How do you recognize a dislocation?
2. How many types of fractures are mentioned, and what are they?
3. What is the first-aid treatment for a simple fracture?
4. What is the treatment for a compound fracture?
5. What is the difference between a sprain and a strain?
6. What is the first-aid treatment for a sprain?
7. What causes the discoloration in a bruise?
8. Mention some different kinds of bandages.
9. For what conditions would one or the other of these kinds of bandages be preferred?
10. Describe the method of applying a triangular arm sling.

CHAPTER FORTY-FIVE

THE TRAINED NURSE

BELIEVING that better understanding of the training and duties of a nurse, by those who employ her, would not only make her work easier, but more effective, I introduced in one of my lectures a brief talk about the trained nurse and her work. The class was eager for a wider knowledge of the subject than could be given in the time, and many questions were asked by this and other groups of students, concerning the training of a nurse, why it is so severe, what was required of the applicant, what type of hospital was best, and what positions nurses were filling. Questions were also asked as to the ways of helping the nurse in her work, making her life happier, conserving her strength, and aiding in her efforts for the benefit of the patient.

In this chapter I am trying to answer these questions and also to give information likely to be of interest to those who wish to become nurses, as well as to those who employ a trained nurse in their homes. A nurse's life is not an easy one, and many nurses are broken down in health and obliged to give up their work earlier than are women of other professions. In many cases this could be avoided if those in whose homes they worked took care not to subject them to unnecessary privation and fatigue. There is no advantage either to nurse or patient in the nurse's wasting needlessly the strength she requires for her real work. Few professions are more interesting and more developing than that of the trained nurse, hard and exacting as the training is. There is a fascination and a broadening influence in the training that might well be valuable to any woman.

Requirements for applicants. Certain requirements are common to most if not all hospitals. The applicant must be healthy, must have passed through the high school, must give

at least two letters certifying to her moral standing, and must in most hospitals be at least nineteen years old. Some hospitals are less exacting in their requirements than others and admit women even as young as seventeen years of age. Anyone in search of thorough training will do well not to choose such a hospital. Seventeen is too young to begin the training; a girl of seventeen has not the experience mentally or physically to meet some of the difficulties she may encounter, and in many cases she begins the training impulsively, without any real understanding of her undertaking.

Large and small schools. In most ways the schools in the larger cities are the better, because they have the means to give the best training, and the number of patients is large enough to give varied experience. In some small hospitals, however, there are certain advantages. A nurse in a small hospital can see and study each case, while in a large hospital her duties are hard and she is frequently not permitted to go from one ward to another. Thus she misses some things in her training which are gained by the nurse in the small school.

It is much better to take a good all-round training in a general hospital, and then, if it seems desirable to specialize in any one branch of the work, to take whatever special training is necessary with the aid of the solid foundation of general experience. A nurse cannot be trained by correspondence. That is impossible. She must come into personal contact with the patient, learning to take temperature and give other treatment, in order to be able to understand her work.

The registered nurse. Many states have passed laws permitting registration to hospitals and nurses. A hospital, to be registered, must not have below a certain number of patients, or it must be affiliated with other hospitals, so that the instruction given to the nurses in the school may be up to a certain standard.

A nurse, to register, must prove that she is a graduate of a registered school, that she is of good moral character, and that

her work both in the school and after leaving it are up to the standard. She must pass an examination in anatomy and physiology, materia medica, and other subjects considered necessary by an examining board appointed by the state. She is then entitled to write after her name the letters "R. N." (Registered Nurse). This registration of nurses was started in an effort to raise the standard of training for nurses and as a means of helping those employing them to obtain nurses of good training and good character.

Health of nurses in the hospitals. In most hospitals particular attention is paid to the health of the nurse, and sometimes young women who enter a hospital in a somewhat run-down and nervous condition leave at the end of their training in much better health.

The living quarters for nurses in training are improved in most of the hospitals, but as there are still some hospitals in which conditions are not satisfactory, it is well to investigate both the living quarters and the food, before deciding on a hospital. If applicants would refuse to enter schools where the nurses' comfort is not properly considered, it would help to raise the standard of those schools.

Hours of duty. For many years a nurse's training was very hard and the hours of duty were unreasonably long. These conditions have been much improved, though the years of training are still not easy and the course should not be undertaken without due consideration.

The improvement has been caused partly by the supervision which is now given to hospitals and training schools. Owing to the fact that in order to register in the state a hospital must be up to a certain standard, not only in size and in living conditions for the nurses but in the amount and quality of the instruction given in the training school, regular inspection is given to all hospitals in which there are training schools for nurses.

Few positions are open to unregistered nurses today, and if

a training school wishes to have a desirable class of educated women it must keep up to the standard.

Conditions of work for private nurses have so improved also that it is a most unusual case where a nurse must work more than twelve hours, many working only eight.

Positions open to nurses. Formerly the only future for a nurse after graduation was to work in a hospital as superintendent or head nurse, or to engage in private nursing. Today her opportunities are so varied that the education and experience which a nurse receives in her training appear to fit her to fill a large number of positions. There are many more hospital openings for her, such as dietitian, anæsthetizer, assistant in charge of X-ray, and laboratory assistant ; social service worker in many branches ; school and rural nurse or sanitary inspector ; physiotherapy and occupational therapy ; visiting nurse for the poor where a salary is paid, or " hourly nurse " where the patient pays ; army, navy, Red Cross, and Public Health Service nurse ; nurse resident in a school ; office nurse ; and too many other positions to enumerate.

Nurse's training and work interesting and gratifying. Many who do not know the interest in a nurse's life think of it as one of hardship only, but to most nurses there is a fascination about the training and the work that more than compensates for its hardship. The studies are scientific and interesting ; progress is constantly being made in both medicine and surgery so that one need never lose interest in studying, not even after the diploma has been received. Indeed, a nurse, if she wishes to keep up in her profession, must continue her studies, even as a good physician does.

Then, too, there is a great satisfaction in the work itself. To feel that one is able to take hold of a difficult situation and, by skillfully handling it, improve community conditions, restore health, or even save a life should be sufficiently gratifying to make one forget the hardships through which one has passed in bringing it about.

Training schools connected with universities. Many of the coeducational universities of today have training schools for nurses affiliated with them. As a rule this is a five-year course and leads to a bachelor's degree. If one is not a college graduate, these courses are excellent, as the scientific training needed by nurses today is thoroughly given.

If the applicant has credit from a normal school or a recognized college, the length of the course is shortened.

Duties of the nurse to the patient. The nurse goes into a house to take care of the patient. Whatever is necessary for the patient's health and comfort is a part of her task. In the case of a delirious patient, or one who is easily excited by the presence of others, the nurse should take care of the sick room. If the presence of a third person is exciting to the patient, and the sweeping of the room by the nurse will lessen this nervousness, this work should be done by her. If, as often happens, food is as much a part of the treatment as medicine, and no one in the house can prepare it properly, the nurse should assume this duty. I have known of good nurses, anxious to do what was right by the patient, who went out to the market and bought the food, and cooked it and served it to the patient. A nurse should not say, "This is not my work; that is not my work; if it is not well done, it is no affair of mine." Occasionally a nurse will say, "My work is only in the bedroom. I do not go out of the room." I have known nurses to carry this to the extreme of requiring a maid to carry vessels from the bedroom to the bathroom to empty them. The nurse's work is to do what is necessary for the patient, give her treatments, keep her records; and if the inefficiency or negligence of others obliges her to supplement her own work by doing some of theirs in order to insure the recovery of the patient, she should not maintain her own rules at the expense of her charge.

One winter I took charge of a woman who had been insane for about two weeks and in charge of a nurse. The physician gave me directions to allow no member of the household to

come into the room, as this had from the first excited the patient to the point of frenzy. Two or three days after I went there, the laundress asked if I would give her a bag of laundry hanging in the closet in the patient's room. As I handed her the bag she said, "Thank heaven, at last the children will be able to have a change of clothing." Then she explained that the bag of laundry had been in that closet ever since the illness of the patient began. When the nurse in charge had been asked to give it to the laundress, she had refused, saying that she had come to the house to nurse a patient, not to collect the family wash!

Needless to say, the nurse owes to the family a sympathy and understanding which should make any such occurrence as this unimaginable. When it is right and suitable for her to answer a question she should do so, remembering at the same time that she is not there to diagnose or prognosticate the case. She should be careful in expressing an opinion, and should never criticize the physician, but should carry out his orders with all possible accuracy. She should remember that the business of the family is not her business, and whatever she may see and hear in the course of her duties is never to be spoken of in other houses.

Duties of the patient to the nurse. The nurse is in the room to do what is necessary for the patient, and in a person who is ill, much is to be overlooked and excused. Nevertheless, there are patients who take advantage of this and call upon the nurse unnecessarily, particularly at night. Moreover, the nurse is only human, and no matter how much she may wish to do so she may not always do things at first as the patient is accustomed to having them done. A little patience on the part of the sick person will enable the nurse to learn more quickly and make her work more satisfactory. It must be recognized also that upon the patient lies a part of the responsibility of recovery, and that if the nurse's advice is not followed, and fretting and impatience interfere with the well-being of the

invalid, neither nurse nor physician can do the work as well as it would have been done with the coöperation of the patient.

Duties of the family to the nurse. If no nurse experienced the lack of consideration found in certain families, fewer families would have to complain that the nurse will not go outside her own specified duties. If nurses were always careful not to lay unnecessary burdens upon the servants, fewer employers would let the nurse wait upon herself rather than see that she was cared for by the maids. The unfortunate feature of the situation is that the consequences of selfishness and injustice do not usually fall on those who commit the offense, but on those who really want to be fair and kindly. The nurse who might not object to doing more than her duty may be forced in self-defense to make a rule and keep to it, in order not to be overworked.

The family should not require needless work of the nurse. Unless there is some reason for the nurse's sweeping the floor and dusting the room, the work should be done by the person who usually performs it. If the cook is competent to prepare the food, the nurse should not be obliged to leave her patient and go into the kitchen. If possible, the sick room should communicate with the bath, or at any rate be on the same floor; for when the sick room is on one floor and the bathroom on another, it entails great additional fatigue in caring for the patient. One nurse whom I know was in bed for months, with a strained back, because, having three patients instead of the two she had expected, she had also to carry all bath water from the second floor to the third and down again. She gave out early in the case, and her financial loss from months of enforced idleness was serious. If someone had been detailed to attend to this piece of manual labor, it would certainly have been far better economy than to consume in it the strength of a trained specialist, which was needed for the care of her charges.

Often, by a little thought, extra care and work for the nurse can be avoided. She cannot rearrange the furniture of other

people's houses, but if a patient on the second or third floor is on a liquid diet, an ice box can be provided there in which to keep the milk. Means may be supplied for her to heat water, make tea or cocoa, and do other work, on the same floor as the sick room, instead of in the kitchen, where it will interfere with the routine of the household. Things which the nurse knows will be needed can be kept on hand.

Miscellaneous extra duties required. A nurse engaged for one patient is not a resident physician, and should not be constantly called upon to treat other members of the family on her own responsibility. In some households it seems to be taken for granted that the duties of the nurse include general oversight of the family. Medicines are handed over to the nurse to give to the children, though the mother or governess may have been administering them for months. She is asked to wash out eyes, give enemas, advise about diet, even to prescribe for ailments and answer questions which should be asked of the doctor. If her patient is not seriously ill, she is usually glad to be helpful; but many a nurse, after working hard with a patient, has been required to spend the few minutes which she might have used for rest, in some attention to another member of the family. There are many women who seem to feel that anyone who is "in the house and not busy just now," even if engaged for certain duties which are well done, ought to be kept occupied. It is well to remember that business is business, and that if you engage a person for certain duties you have no right to require anything more of her.

Recreation and rest. The nurse is entitled to her hours off for recreation. When the patient is extremely ill she often gives up this time, remains within call, never goes out, and works with all her mind and heart and body to save the life and health of her helpless charge. At the end of that time, when convalescence has begun, she not only may but should take her due time for recreation, and it is only fair for the employer to give it to her freely and ungrudgingly.

The kindness and appreciation of the mother of one of my early patients is always a bright memory. The boy was ill with typhoid fever, and as there had been two deaths from this disease in the immediate family, anxiety about the case was natural. He had a rather mild attack, but to relieve the strain upon the mother I stayed in very closely, not taking my daily walk, and remained within call until he was out of danger. I then found that the mother wished me to go out for the whole afternoon every day. I reminded her that she was giving me more than was my due, and she said that I had given her many long hours to which I was entitled. I suggested to her that a nurse's hours of rest were not usually cumulative, and that as she was doing what few would think of, she might spoil me.

"I hope," she said, "that you will find you are mistaken about that. If you do not, I shall like to think that you will look back upon this case with pleasure, and remember our great appreciation and gratitude to you for the care and thought which you have given us."

More generous giving might exist in this world if it met with more generous receiving; but the attitude of a great many people is expressed in the old proverb, "The more you do, the more you may do," and this inevitably tends to cool the ardor of those who would like to give themselves freely.

The nurse's bed. When a nurse spends weeks of hard work, perhaps, helping to bring a well-loved member of the family back from death, she sometimes has nothing in the way of a bed but a cot or an uncomfortable makeshift couch. The family argues that it is only a temporary arrangement and there is no need of going to the expense of buying a bed. One thing which breaks down the health of nurses is the uncomfortable way in which they have to sleep. A member of the family may for a week or two, during someone's serious illness, sleep on a couch, or on a mattress on the floor, but at the end of that time he goes back to a comfortable room; the nurse

goes from one patient to another and one temporary sleeping berth to another, year in and year out. I knew of one case in which the nurse slept for seven weeks on a couch so short that she had to put her feet on a chair at the foot of the couch and so narrow that when she wanted to turn over she had to stand up, turn around, and lie down again. Cases of this kind occur, not in the houses of the poor, but in the ordinary emergencies of well-to-do people. The nurse has no remedy but to give up the case, and that for obvious reasons she cannot often do.

The nurse's meals. It is very hard for a woman to sit up all night, working hard, possibly having a very poor lunch, and when morning comes and she is thoroughly exhausted, to see the members of the family, after a good night's rest, go down to breakfast and then, possibly at nine or half-past nine or ten o'clock, remember that the nurse should have hers. An early cup of coffee or an early breakfast does much to keep her from becoming fatigued. Personal oversight should be given to the midnight tray for the nurse. Many maids are careless in its preparation, sometimes forgetting it entirely. There is no exhaustion greater than that of a tired nurse between two and five o'clock in the morning; and it does not help her when she goes to her room, hoping to brace herself with food against those early morning hours, to find a tray carelessly prepared, lacking salt, pepper, or sugar, with thick slices of bread and weak coffee, and showing in every way that no one has given thought to her and her comfort.

Contrast with such neglect one of my cases, that of a man critically ill with pneumonia, who was given an open-air treatment in midwinter — always hard on the nurse. At one o'clock each morning his daughter would call me to my supper, prepared with her own hands — hot soup or oysters, hot coffee or chocolate, on a dainty tray, served in the most tempting fashion.

"I could never be happy," she said, "if I knew that anyone was working as hard as you do for a member of my household

and I was not doing everything that I could to make her comfortable."

She was one woman in a thousand, and nurses do not expect such thought as that; but they have a right to expect a little care from people for whom they are doing so much. Nurses excuse this thoughtlessness by saying, "People are worried and don't think," and this no doubt is true in many cases.

Excessive fatigue in the nurse naturally reacts against her work in her care of the patient. See that she has her hours of rest and, where it is necessary, bring in a nurse to relieve her. One of the wonders of the world is the few mistakes that are made by nurses who have worked to such a point of exhaustion that they should not be held mentally or physically responsible for their acts. If a nurse asks to have someone relieve her and stay in the room when she is out attending to other things, be ready to give her this help; for often the nurse who is with a case constantly recognizes slight delirium long before the doctor can see it. A delirious patient is always anxious to get out of bed. Many times, when she appears to be all right, she is slightly delirious; and many accidents can be avoided by the willingness of the family to relieve the nurse when she asks them to do so.

Visits from the family. The visits of the family to the patient should be subject to the orders of the physician and the judgment of the nurse. When a patient is very weak, constant visits from the family and friends are fatiguing. Sometimes a certain member of the family will irritate and excite the patient. When delirious, persons are often most excited or even irritated by the presence of those whom they love best. When a physician orders a member of the family kept out of the room, the family should understand that it is done absolutely for the good of the patient, and respect the order.

When permitted to go into the sick room, a visitor should stay only as long as the doctor has given him leave to stay.

If the patient is fatigued before the time is up, and the nurse asks the visitor to leave, no irritation should be felt in acceding to this request. Many patients have had relapses because of fatigue from seeing their friends too long. If, when the doctor has given permission to one or two persons to see the patient, those who come first are allowed to go in, the later comers should feel no pique or sensitive unhappiness at not being allowed to follow. The nurse is simply carrying out the doctor's orders, and it is of no personal importance to her who is allowed to come into the sick room, except in as far as it affects the patient.

QUESTIONS

1. Give some of the requirements for an applicant wishing to enter a training school for nurses.
2. Compare the advantages in large and in small training schools.
3. By what means does the small school manage to give an all-round training?
4. Why have state laws been passed permitting nurses to register?
5. What has brought about the improved methods for instructing nurses and made their hours of work shorter?
6. Why should the training be of benefit to a woman who does not expect to work in the profession?
7. Mention some of the positions now open to nurses.
8. Mention some of the duties which the nurse owes to her patient.
9. Mention those which the patient owes to the nurse.
10. What should be done for the nurse's comfort and well-being while she is employed in the household?

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7 drops of iodine,
 To 2 oz. of glycerin.
 For Exema

1 Teas. Salt, (level)

1 Teas. Boric acid crystals.

1 Teas. Soda.

Dissolve in 1 quart boiling Water
keep covered. 3 to 4 times a day
pour a little into a glass heat to
Blood Temp. in wash basin - pour
some in Palm of hand and snuff.

2 Tablesp. Milk Sugar

2 " " Soda mix Together

1 Teasp. Salt

Dissolve 1 Teasp. of this mixture
in one cup of warm water and
douché nose every night before
bedtime.

Hand Cream:

cups water
oz stearic Acid
oz Glycerin
oz strong Ammonia
qu. inch Paraffin
gram powdered Borax
drop coloring (pink)
perfume or Cologne

Put stearic Acid, Paraffin (cut up)
and Glycerin into an enameled
double boiler. When dissolved add
ammonia (turn face away) Beat
until milky. Dissolve Borax in
little warm water. Beat slowly
until cream thickens. Add borax
slowly to mixture - add coloring
and Perfume - put in jars cool and
cover

